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JOURNAL OF THE PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.

On the Vegetation of Clarence Peak, Fernando Po; with Descriptions of the Plants collected by Mr. GUSTAV MANN on the higher parts of that Mountain. By J. D. HOOKER, Esq., M.D., F.R.S., F.L.S., &c.

[Read March 7th, 1861.]

A KNOWLEDGE of the temperate flora of any spot on the west coast of Tropical Africa has long been one of the greatest desiderata in botanical geography, not only on account of the intrinsic interest that must attach to the plants of the extremely few isolated points so elevated as to possess a temperate climate in that vast humid and torrid area, but also from the light such plants might be expected to throw on the floras of St. Helena, the Cape de Verd, and the Canaries; all of which (and especially the former) contain peculiar endemic genera, whose nearest allies might be expected to exist on the mountains of the neighbouring continent.

Within the last year the outlines of such a desiderated flora have been supplied by the energy and resolution of Mr. Gustav Mann, of the Royal Gardens, Kew, who was appointed by Lord John Russell (Foreign Minister) to succeed the late lamented Barter, as botanist to Dr. Baikie's Niger Expedition, but who, being unable to ascend the river and join that expedition, has devoted a year and a half to exploring the island of Fernando Po, and has twice reached its lofty summits, 10,700 feet above the sea; on both occasions collecting indefatigably and preserving his collections well.

Mr. Mann's account of the first of these ascents has already been read before the Society; he commenced the expedition on the 23rd March, 1860, and reached the summit on the 3rd April, where the temperature fell to 39° at night. The return was accomplished on the 13th of the same month. A second ascent was attempted on the 7th of November, and after eighteen days he had nearly reached the top, when his men rebelled, and he was obliged to return to Clarence. He started a third time, and reached the summit in December, but the dates and detailed narrative of this ascent have not yet arrived.

The following notes chiefly refer to the temperate plants, all but one of which (*Sanicula Europæa*) were collected at or above 5000 feet elevation. They amount to 76 species (in 66 genera), a singularly small number for 5700 feet of vertical height almost under the equator. Of these fully 20 are tropical types that ascend a little above 5000 feet, and must be excluded from the temperate flora. The remaining 56 belong to no fewer than 45 genera; proving the flora to be an extremely fragmentary one.

Of the total 76, 37 are Abyssinian species, and 16 others closely allied to such; and of the 56 temperate, 32 are also natives of the mountains of Abyssinia, most of them being absolutely specifically identical, and others but slightly differing; such differences being in some cases doubtless apparent rather than real, and owing to the want of a larger suite of specimens; 13 others also are very closely allied to Abyssinian species.

Again, of the Abyssinian mountain plants common to Clarence Peak, no fewer than 17 are absolutely peculiar to these two localities as far as is at present known, including some very remarkable plants; as

Clematis Simensis
Thalictrum rhynchocarpum
Sagina Abyssinica
Trifolium subrotundum
—— Simense
Helichrysum chrysocoma
—— Hochstetteri
—— globosum
Blæria spicata
Stachys aculeolata, n. sp.
Pycnostachys Abyssinica
Calamintha Simensis
Cyanotis Abyssinica ?
Kyllingia macrocephala
Trisetum lachnanthum
Festuca Schimperiana
Gymnandropogon, sp.

Besides these are the following, which are not found south of Abyssinia in Africa:—

Galium rotundifolium
Parietaria Mauritanica
Deschampsia cæspitosa
Brachypodium sylvaticum.

Others are common to Abyssinia, the Mauritius, Madagascar, &c.: as

Viola Abyssinica
Hypericum angustifolium
Geranium Simense
Rubus apetalus
Carex Boryana.

There are, again, other species whose only near affinities are with Abyssinian: as species of

Agrocharis
Gymnosciadium?
Dichrocephala
Swertia
Plectranthus
Veronica
Euphorbia
Habenaria.

Extending the comparison to genera, I find that of the 66 Clarence Peak genera only 7 are not Abyssinian, and of the 45 temperate genera 41 are temperate Abyssinian. Of the 3 remaining, *Luzula* and *Schœnus* may yet be found in Abyssinia, and *Leucothoe* is a Mauritius plant.

The next affinity is with Mauritius, Bourbon, and Madagascar: of the whole 76 species, 16 inhabit these places, and 8 more are closely allied to plants from there. Three temperate species are peculiar to Clarence Peak and the East African Islands, including *Leucothoe angustifolia, Sebæa brachyphylla*, and *Carex Wahlenbergiæ*. *Ericinella* and *Leucothoe* are the only genera not Abyssinian, which are common to these islands and to Fernando Po.

Lastly, if compared with the Cape, the contrast is very striking: not only is there a total want of any true Cape types, except such few as are common to Abyssinia or the Eastern African Islands (5 species), but only 12 of the 76 Fernando Po species are known to be South African; and of these all but *Luzula* have been also found in Abyssinia. Only 12 others are nearly related to South African forms. Turning to the genera, *Peddiea* is the only peculiarly South African one; and this is not temperate at Fernando Po, and is subtropical in South Africa.

Hence the result of comparing the Clarence Peak flora with that of the African continent is—1. The intimate relationship with Abyssinia, of whose flora it is a member, and from which it is separated by 1800 miles of absolutely unexplored country*; 2. the curious relationship with the East African Islands, which are still further off; 3. the almost total dissimilarity from the Cape flora.

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* This result is strongly in favour of the existence of a chain of mountains crossing Central Africa, from Abyssinia to the Cameroons Mountains, of whose probable existence M. du Chaillu has recently procured evidence.

With the West African Islands again, contrary to my expectations, there is no marked relationship whatever, except obscurely with St. Helena through *Wahlenbergia arguta*: the arborescent *Compositæ* and *Lobeliaceæ*, *Phylicæ*, *Melhaniæ*, *Frankenia*, *Acalypha*, and frutescent *Heydotis* of St. Helena, being wholly unrepresented in Fernando Po.

Taking a still wider range, the temperate flora of Fernando Po belongs to the northern hemisphere. Of the 48 temperate genera, 12 only are not European; whilst the following species are European, and most of them British:—

Oxalis corniculata
Sanicula Europæa
Galium Aparine
—— rotundifolium
Limosella aquatica
Parietaria Mauritanica
Luzula campestris
Deschampsia cæspitosa
Brachypodium sylvaticum.

The two following are also probably states of European plants:—*Ranunculus pinnatus*, very near *R. philonotis*; *Calamintha Simensis*, near *vulgaris*.

RANUNCULACEÆ,

Of this Order, which is very far from well-represented, even in the temperate and alpine regions of Tropical and Southern Africa, three genera, each containing a single species, were collected by Mr. Mann on Clarence Peak. All are Abyssinian; one only, and that a plant of very wide distribution, is South African also.

1. **Clematis Simensis**, *Fresen*; *Rich. Fl. Abyss.* i. 3.

Hab. In Clarence Peak, alt. 4–8000 ped. (fl. Nov.)—Alte scandens, 120-pedalis! Flores albi.

The flowers are a little smaller than the Abyssinian specimens. A. Richard describes this species as glaucous in all its parts, but such is not the case in all our authentically named specimens, nor in these from Fernando Po, which have also more membranous foliage; such differences are what the more humid climate of West Tropical Africa would lead us to expect. The lower parts of the filaments are also rather more silky in Mann's specimens, but this is a variable character. I have no fruiting individuals. This species is found throughout Abyssinia at 8000 feet elevation.

2. **Thalictrum rhynchocarpum**, *Quart. Dill. & Rich.*; *Rich. Fl. Abyss.* i. 3.

Hab. In Clarence Peak, alt. 10,000 ped.

Herba 12-pedalis. Fl. virides. Stamina numero varia, interdum plurima.

A most remarkable species, and quite unlike any other hitherto described. A. Richard rightly characterizes it as one of the best-marked species of the genus. Mann's specimens are in flower only, and have the pinnules sometimes a little more divided than in Abyssinian ones; it is not uncommon in mountain woods of Abyssinia.

3. Ranunculus pinnatus, *Poir.*, var. *extensa* carpellis lævibus.

Hab. In Clarence Peak, alt. 8500 ped. (fl. Dec.)

Caules graciles, elongati, flexuosi, interdum ad nodos radicantes. *Folia* longe et gracile petiolata, pinnata v. biternata, foliolis longe petiolulatis.

This in every respect agrees with *R. pinnatus*, Poir, of Southern Africa, except in its more drawn-out habit (a feature doubtless attributable to the climate of Fernando Po), and the total absence of any tubercles on the carpels. This last, however, is a variable character, and often wanting in the very closely allied *R. philonotis*, Retz., of Europe, which, with the present and some other plants of India and America, will, I suspect, ultimately prove to belong to one collective, widely diffused species.

MENISPERMEÆ.

1. Stephania hernandifolia, *Wall.*; *H. f. & T. Flor. Ind.* i. 196. cum Syn.

Hab. In Clarence Peak, alt. 3–5000 ped. (fl. Dec.)

Identical with the Indian plant, which is also a native of various parts of Tropical and Southern Africa, Java, and Australia.

VIOLARIEÆ.

1. Viola Abyssinica, *Steud.*, var. *impunctata*.

Hab. In Clarence Peak, alt. 10,000 ped. (fl. April.)

Caules repentes, elongati, hic illic radicantes. *Folia* impunctata. *Flores* pallide purpurei.

Except in wanting the oblong brown maculæ on the foliage, I can find no distinction whatever between this and the plant of Abyssinia, where as at Fernando Po, it grows in the region of heaths. It is also found in Madagascar with unspotted foliage.

PITTOSPOREÆ.

1. PITTOSPORUM MANNII, *H. f.* Foliis elliptico-lanceolatis utrinque attenuato-acuminatis margine undulatis, paniculis ramosis multifloris puberulis, floribus parvis, capsula parva latissime obovoidea.

Hab. In Clarence Peak, alt. 8500 ped. (fl. Dec.)

Frutex 20-pedalis. *Folia* petiolata, glaberrima, $2\frac{1}{2}''$–$3\frac{1}{2}''$ long., utrinque viridia, glaberrima. *Panicula* subpyramidalis, $1\frac{1}{2}''$ long., erecta, ramis erecto-patentibus. *Flores* $\frac{1}{5}''$ long., flavi; sepalis basi connatis, acutis, glabriusculis petalis obtusis dimid. brevioribus; ovario staminibusque glaberrimis. *Capsula* (unica tantum visa) $\frac{1}{4}''$ long., $\frac{1}{3}''$ lata, basi abrupte angustata, apice retusa.

Allied to *P. Abyssinicum*, Hochst., which has generally obtuse leaves; and more closely still to the Mauritius *P. Senacia*, Putt., but differing from both in the erect paniculate inflorescence, smaller flowers and very different capsule.

CARYOPHYLLEÆ.

1. Sagina Abyssinica, *Hochst.*; *Rich. Fl. Abyss.* i. 47.
Hab. In Clarence Peak, alt.? (fl. Dec.)

This is absolutely identical with the Abyssinian plant, and is a very distinct species from any other. The flowers are often tetramerous. The only other Fernando Po plant of this order is *Drymaria cordata*, W., which grows at low levels.

HYPERICINEÆ.

1. Hypericum angustifolium, *Lamk.*; *DC. Prodr.* i. 545.
H. leucoptychodes, *Steud.*; *Rich. Fl. Abyss.* i. 96.
Hab. In Clarence Peak, 7–10,000 ped. copiosissime. (fl. Dec.)
Arbuscula 30-pedalis. *Folia* interdum et sepala secus marginem punctata, sæpius omnia impunctata.

The Bourbon specimens of this noble plant have the leaves rather narrower than the Abyssinian, and wholly impunctate. In both the Fernando Po and Abyssinian specimens, the calyx and leaves have sometimes the margins punctate. The leaves of the Fernando plant are in some specimens like the Abyssinian, in others like the Bourbon. It is a very common tree in the mountains of Abyssinia.

GERANIACEÆ.

1. Geranium Simense, *Hochst.*; *Rich. Fl. Abyss.* i. 116.
G. Emirnense, *Hils. & Bojer*, MSS. in *Hb. Hook.*
Hab. In Clarence Peak, alt. 8500 ped. (fl. Ap.–Dec.)

Mr. Mann's specimens are identical with Bojer's Madagascar *G. Emirnense*, and with some of Schimper's Abyssinian *G. Simense*, which A. Richard describes as a very variable plant, and common in the cold regions of Abyssinia.

BALSAMINEÆ.

This order is probably common in the hilly regions of Tropical Africa, whence I have seen about a dozen species. Only one, however, is described as Abyssinian, and one South African. I shall here describe four Fernando Po species, of which only one ascends to 5000 feet, and none have been found above that elevation. I have referred these to the sections adopted in the monograph of the East Indian species, published in the fourth volume of this Journal. They are as follows:—

1. UMBELLATÆ. Folia alterna. Flores ad apicem pedunculi elongati congesti v. dense racemosi.
2. UNIFLORÆ. Folia alterna. Pedicelli in axillis foliorum solitarii v. fasciculati, uniflori.
3. LATERIFLORÆ. Folia alterna. Flores racemosi, racemi foliis breviores v. axillis foliorum inferiorum dispositi.

1. IMPATIENS (UMBELLATÆ) FILICORNU, *H.f.* Foliis longe petiolatis,

late ovatis acutis setoso-crenatis, pedunculis elongatis gracillimis, apice floriferis, bracteis imbricatis cymbiformibus caducis, sepalis lateralibus obtusis, vexillo erecto late oblongo, labello planiusculo, calcare strictiusculo gracillimo alis æquilongo instructo.

Hab. In Clarence Peak, alt. 5000 ped. (fl. Dec.)

Herba tota glaberrima, pedalis; caule gracili simplici. *Folia* alterna, sub 2'' long., petiolis æquilonga, membranacea. *Pedunculi* laterales folia superantes, gracillimi, apices tantum floriferi, et ibi bracteis delapsis cicatricati. *Bracteæ*, $\frac{1}{3}$'' long., obtusæ. *Pedicelli* gracillimi, $\frac{3}{4}$'' long., erecti. *Flos* pallide purpureus, 1'' diamet. planus. *Alæ* bilobæ, lobo laterali brevi obtuso, terminali oblongo obtuso.

This has very much the habit of the Ceylon *I. subcordata*, Arn.

2. **Impatiens (Unifloræ) Mannii**, *H.f.* Caule gracili basi repente, foliis subdistantibus gracile petiolatis, petiolo glanduloso, ovatis acuminatis basi attenuatis setuloso-crenatis, pedicellis 1–2-axillaribus gracilibus ebracteolatis 1-floris, sepalis lateralibus parvis, vexillo mediocri, labello late conico calcare gracili curvo, alis longe gracile petiolulatis, lobo laterali unciformi parvo, terminali lato.

Hab. In Fernando Po, alt. 4000 ped. (fl. Dec.)

Herba 2–3'-pedalis, glaberrima, gracilis. *Folia* 2–3'', petiolo, $\frac{1}{2}$''–1'', glandulis gracilibus ornato. *Pedicelli* graciles, petiolis breviores, fructiferi deflexi. *Flores* pulcherrimi, "rubidi" (*Mann*), sicco violacei, labello transverse fasciato. *Alæ* cum ungue gracili fere 1'' longæ.

3. **Impatiens (Unifloræ) bicolor**, *H.f.* Suffruticosa, foliis confertis petiolatis elliptico-lanceolatis obtusis v. acuminatis basi attenuatis grosse setuloso-crenatis, pedicellis unifloris in axillis foliorum solitariis v. confertis ebracteolatis, vexillo parvo erecto, labello amplo late saccato basi in cornu valido ascendente incurvato contracto, alis parvis late oblongis obtusis.

Hab. In Fernando Po, alt. 4000 ped. (fl. Dec.)

Herba 2–3-pedalis, caule basi lignoso robusto, nodoso, superne cicatricato. *Folia* versus apices caulis conferta, patentia, 4–6'' long. in petiolum 1'' long. angustata, subcarnosula. *Flores* conferti, perplurimi (v. rarius pauci), bicolores, pedicellis 1'' long., sæpissime liberis, interdum in pedicellum brevem fasciculatis. *Sepala lateralia* parva, viridia. *Vexillum* flavo-virens $\frac{4}{3}$'' long., erectum. *Labellum* purpureum. *Alæ* longitudine oris labelli, flavæ purpureo lineatæ.

4. **Impatiens (Laterifloræ) hians**, *H.f.* Foliis alternis longe petiolatis ovatis acuminatis basi rotundatis longe setosis setuloso-crenatis, racemis ex axillis inferioribus ortis, bracteis ovato-lanceolatis persistentibus, floribus magnis hiantibus, vexillo amplo erecto orbiculato dorso alato, labello demisso longe crasse conico stricto ore valde obliquo, alis linearibus.

Hab. In Fernando Po, alt. 2000 ped. (fl. Dec.)

Herba gracilis, erecta, glabra, 2$\frac{1}{2}$-pedalis, caule simplici basi radicante.

Folia membranacea, glaberrima v. superne sparse pilosa, 2½″–4″ long., basin versus utrinque setis ½″–¼″ longis filiformibus 1–2 ornata; petiolo 1″ long. *Pedunculi* foliis breviores, patentes, 2–6-flori. *Flores* gracile pedicellati, rubri, bilabiati. *Sepala lateralia* viridia, ¼″ long. *Vexillum* ¾″ lat., dorso late alatum. *Labellum* 1½″ long. *Alæ* ore labelli subæquantes, v. paulo superantes. *Capsula* linearis.

There is another species of *Impatiens* in the Herbarium, but in too imperfect a state for description.

Nat. Ord. OXALIDEÆ.

1. Oxalis corniculata, *L.*

Hab. In Clarence Peak, alt. 8500 ped.

Nat. Ord. OCHNACEÆ.

1. GOMPHIA MICRANTHA, *H.f.* Glaberrima, foliis lanceolatis acuminatis serrulatis utrinque nitidis venis remotis arcuatis, racemis terminalibus elongatis paucifloris vix ramosis folio brevioribus, floribus minutis remote fasciculatis glaberrimis.

Hab. In Clarence Peak, alt. 5000 ped. (fl. Nov.)

Frutex 15-pedalis. *Rami* graciles, virgati, teretiusculi. *Folia* breve petiolata, 4–6″ long., membranacea, utrinque concolora. *Racemi* gracillimi, pauciflori. *Flores* breviter pedicellati, 1‴ longi. *Calyx* brunneus, foliolis oblongis. *Petala* rufa.

LEGUMINOSÆ.

The three plants of this family which have been found above 5000 feet, are all essentially temperate forms—one *Cytisus*, typical of the Mediterranean region and Canary Islands, but hitherto unknown in Tropical Africa, and known by one species only in Abyssinia: the others belong to *Trifolium*, also a Mediterranean genus, but several species of which are Abyssinian, including both the Fernando Po ones.

1. CYTISUS MANNII, *H.f.* Sericeo-pilosa, ramulis divaricatis villosis, foliis parvis brevissime petiolatis stipulis subulatis, foliolis elliptico-lanceolatis involutis, floribus ad apices ramulorum confertis sessilibus, calycis labio superiore late bifido.

Hab. In Clarence Peak, alt. 9000 ped. (fl. Dec.)

Frutex 5–6-pedalis, ramis lignosis, ramulisque divaricatis teretiusculis. *Folia* solitaria et fasciculata, ¼″ long., stipulis subulato-lanceolatis petiolo adnatis, foliolis acutis 1½‴ long. *Flores* flavi, ⅓″ expans. *Calyx* bilabiatus, sericeus, labio superiore late bifido lobis acuminatis, inferiore apice trifido, lobis subulatis. *Vexillum* orbiculatum dorso sericeum. *Alæ* carinam obtusam genitalia includentem æquantes. *Staminum* tubus integer. *Ovarium* hirsutulum; stylo gracili mediocri; stigmate fere terminali; ovulis paucis.

2. Trifolium subrotundum, *Steud. & Hochst.*; *A. Rich. Flor. Abyss.* i. 172. *Var.* stipulis majoribus.

Hab. In Clarence Peak, alt. 9000 ped. (fl. Dec.)

Herba diffusa, 1–2-pedalis, corolla rubra.

A common Abyssinian plant, cultivated as horse-forage according to Dr. Roth (Herb. Hook.). The Fernando Po specimens differ in having larger stipules ($\frac{3}{4}''$ long.) than the Abyssinian, in which, however, they are very large for the genus (nearly $\frac{1}{2}''$): in habit, foliage, inflorescence and flowers they are identical.

3. Trifolium Simense, *Fresen*; *A. Rich.*, l. c. 171.

Hab. In Clarence Peak, alt. 8500 ped. (fl. Dec.)

Herba $1\frac{1}{2}'$ alt., corolla violacea.

Very similar, as A. Richard indicates, to *T. subrotundum*, but well distinguished by the calyx, very narrow leaflets, and short petioles. The stipules terminate in a long filiform appendage, both in the Fernando Po and Abyssinian specimens.

ROSACEÆ.

1. Rubus apetalus, *Poir.* *Var.* glabrior petalis parvis instructa.

Hab. In Clarence Peak, alt. 7000 ped. (fl. Nov.)

Scandens 12–15-pedalis. *Petala* alba, valde caduca.

This is clearly a form of *R. apetalus* of Bourbon, of which I have examined a Bourbon specimen gathered by Carmichael. Another form of it, sometimes bearing petals, and otherwise differing in having glabrous carpels, is found in Madagascar. A third, always petaliferous, is the *R. exsuccus*, Steud., of Abyssinia, which is described by A. Richard (Fl. Abyss. i. 256) as having the fruit entirely dry, but of which Dr. Roth remarks, "Berries eatable" (MS. in Hb. Hook.). Dr. Kirke, who has gathered the latter species in the Shirà Mountains (Livingstone's Exped., 1860), says, "Fruit good, exactly like the bramble, but small." The Fernando Po specimens are are not in fruit. This species has not been found in South Africa.

UMBELLIFERÆ.

1. Sanicula Europæa, *L.*

Hab. In Fernando Po, alt. 4000 ped. (fl. Nov.)

I should suspect some error in the low elevation assigned by Mr. Mann to this plant, were his specimens not so carefully ticketed in other cases that I have every reason to put confidence in this. A. Richard gives *S. Europæa*, var. *Capensis*, as a native of Abyssinia; he does not, however, say what the characters of that variety are, and adds that his specimens are identical with Parisian. This plant has a very wide range in the mountainous regions of both Americas and Asia, and is also found in South Africa.

2. AGROCHARIS GRACILIS, *H. f.* Caule elongato ramoso foliisque hispidulo-pilosis, foliis gracile petiolatis bipinnatisectis segmentis lanceolatis acutis incisis, pedunculis elongatis sub apices patentim hispidis pilis flexuosis, floribus dense congestis.

Hab. In Clarence Peak, alt. 7000 ped. (fl. Dec.)

Herba gracilis, 4-pedalis, *A. melananthæ* (Abyssiniæ) quam maxime affinis, differt caule gracili elongato ramoso, foliis magis pilosis, capi-

tulis minoribus densius congestis, pedunculisque apices versus patentius pilosis pilis laxioribus flexuosis.

It is with some hesitation that I venture to describe this plant as different from the Abyssinian, fearing the characters depend wholly on locality. This curious genus is allied to *Daucus*, and the Abyssinian is the only previously described species.

3. Gymnosciadium ? ?

Hab. In cacumine Clarence Peak, alt. 10,000 ped.

Herba pilosa, radice valida insapida, caulibus 4–6″ longis; foliis pinnatis, pinnis paucijugis crenatis rhombeo-rotundatis reniformi-rotundatisve terminali cordato. *Umbellæ* compositæ. *Involucrum* generale nullum, partiale foliolis paucis. *Calycis* margo integer. *Petala* inflexa. *Styli* breviusculi.

This may belong to the Abyssinian genus to which I have doubtfully referred it; but not being in fruit, nothing can be made of it.

4. Genus ?

Hab. In Clarence Peak, alt. 9500 ped. (fl. Dec.)

Herba glabra, elata, 2–3-pedalis; radice insapida; caule tereti striato; foliis radicalibus tripinnatis, foliolis ovato-lanceolatis, lobatis, pinnatifidisve, segmentis acutis. *Umbella* composita. *Involucrum* universale et partiale foliolis paucis linearibus. *Calycis* limbus 5-lobus, lobis acutis. *Petala* inflexa. *Styli* mediocres recurvi. *Mericarpia* immatura anguste oblonga, late alata, dorso 5-juga.

This is a very ordinary form of *Umbellifera*, presenting no striking character.

ARALIACEÆ.

PARATROPIA MANNII, *H.f.* Glaberrima, foliis 4–9 foliolatis, petiolis petiolulisque gracilibus, foliolis ovato- v. oblongo-lanceolatis longe acuminatis integerrimis superne lucidis venis inconspicuis, marginibus subundulatis, floribus in capitulos arcte connatis, capitulis secus ramos simplices elongatos racemosis longe pedunculatis.

Hab. In Ins. Fernando Po, alt. 5000 ped, (fl. Dec.)

Arbor 40-pedalis, caule crasso. *Folia* stipulata, stipulis 1″ dorso supra medium petiolo adnatis ovato-lanceolatis subspathaceis; petiolo 6–8″, tereti; petiolulis 1½″ apice subarticulatis; foliolis 4–7″ coriaceis, inferne opacis. *Inflorescentia* ut videtur terminalis, ramis floriferis in ramulo apice crasso confertis, 1′ et ultra, strictis, érectis, v. erecto-patentibus, basi bracteatis; bracteis stipulis similibus. *Capitula* diam. pisi, globosi, sub-20-flori, secus pedunculos floriferos racemosi, pedunculis crassis 1″ long. post anthesim sæpe decurvis. *Flores* sub $\frac{1}{6}$″ expans., flavi, hermaphroditi ? bracteolis late ovatis pubescentibus ovario brevioribus suffulti. *Ovarium* late obconicum, 5-loculare, obscure angulatum. *Calycis* limbus truncatus, integer, brevis, liber. *Petala* ovata apice inflexa. *Filamenta* subulata petala æquantia; antheris breviter oblongis flavis. *Stigmata* punctiformia, disco late conico vix elevato.

A very handsome plant, of which Mr. Mann has collected excellent specimens.

Rubiaceæ.

1. Galium Aparine, *L.* *Var.* hamatum.

G. hamatum, *Hochst.*; *A. Rich. Flor. Abyss.* i. 345.

Hab. In Clarence Peak, alt. 6–8000 ped. (fl. Dec.) Flores flavi.

I find it impossible to distinguish this from *G. Aparine*, L. A. Richard remarks of the Abyssinian specimens of *hamatum*, that the hooks of the leaves are stronger and more marked than in any other of the genus; but I do not find them to be so in his or this plant, though more strong than in many European specimens of *G. Aparine.* Mr. Mann describes the flowers as yellow, A. Richard as *apparently* purple. It is also a native of South Africa and many other parts of the world.

2. Galium rotundifolium, *L.* *Var.* foliis acutioribus.

Hab. In cacumine Clarence Peak, alt. 10,000 ped. (fl. Dec.)

All the leaves of the Fernando Po specimens are acute, or rather mucronate; some of those of the Abyssinian specimens are so too, whereas in the European and Indian forms they are more or less obtuse: still all the other characters appearing identical with those of the European, I cannot separate this on the grounds of one which is variable. Mann describes the flowers as yellow; in the dried specimens they appear white.

3. ANTHOSPERMUM ASPERULOIDES, *H.f.* Parvulum, caule flexuoso teretiusculo hirtello, foliis parvis fasciculatis lanceolatis subsessilibus, stipulis utrinque rigide subulatis marginibus recurvis parce hispidulis, floribus parvis tetrameris, coccis oblongis lævibus glaberrimis.

Hab. In cacumine Clarence Peak, alt. 10,000 ped. (fl. Dec.)

Herba parvula, 8″ alt., parce ramosa, foliosa. *Caules* teretiusculi. *Folia* densa, patula, $\frac{1}{4}''$ long.

Allied both to Cape and Abyssinian species, but distinct from any known to me by the small size, flexuose habit, and erect subulate limb to the sheathing stipules.

Compositæ.

1. VERNONIA CLARENCEANA, *H.f.* Erecta, herbacea, gracilis, subhispido-pilosa; caule parce diviso subflexuoso, foliis linearibus lineari-lanceolatisve sessilibus semi-amplexicaulibus remote serrato-dentatis acuminatis, capitulis multifloris ad apicem caulis congestis breve pedunculatis, pedunculis tomentosis, involucri late campanulati squamis rigidiusculis lineari-lanceolatis acuminatis purpureis, dorso pilosis subherbaceis.

Hab. In Clarence Peak, alt. 8500 ped. (fl. Dec.)

Herba rigidiuscula, 1–2-pedalis. *Caulis* purpureus, laxe foliatus, superne subvillosus. *Folia* 2–3″ long., suberecta, paulo recurva, $\frac{1}{3}''$–$\frac{3}{4}''$ lat., inferiora in petiolum subangustata, superiora basi latiora, rigide membranacea, utrinque subhispido-pilosula, nervis paucis prominulis. *Capitula* 10–15 ad apices ramulorum, $\frac{1}{3}''$ long. et lat. non bracteata.

Involucri squamæ sub 2-seriales, enerves, margine scariosæ. *Receptaculum* planum, foveolatum, nudum. *Flores* numerosissimi, perplurimi fœminei; tubus corollæ gracilis, pappo et stylo gracili dimidio brevior. *Pappus* albus, nitidus, 1-serialis, pilis filiformibus flexuosis scaberulis. *Achænium* parvum, pallidum, glaberrimum, valde compressum, oblique obovoideum, margine subincrassato. Fl. masc. pauci, 5-dentati.

This belongs to the section with *V. attenuata*, DC., and is most nearly allied to an Abyssinian one called *V. inulæfolia*, Steud.

2. Adenostemma viscosum, *Forst.*

Hab. In Fernando Po, alt. 4–8000 ped. (fl. Dec.)

Herba 3–4-pedalis, corollis albis.

I believe that there is but one species of this genus in the Old World; it is a native of Abyssinia (*A. Schimperi*, C. H. Schultz), of South Africa, of all Tropical Asia and the Pacific Islands. The Fernando Po form is the common Indian one.

3. **DICHROCEPHALA OBLONGA**, *H.f.* Hispidulo-pilosa, caule tereti apice ramoso, foliis sessilibus patulis lineari- v. oblongo-lanceolatis acuminatis irregulariter pinnatifido-lobatis marginibus recurvis lobis subremotis incisis lobulis acutis v. mucronatis, capitulis late oblongis purpureis, involucri squamis 6–8 herbaceis pubescentibus, receptaculo columnari.

Hab. In cacumine Clarence Peak, alt. 10,700 ped. (fl. Dec.)

Herba erecta, rigidula, 1–2-pedalis. *Folia* 1½″–2″ long.; ⅓″–½″ lat. *Capitula* ¼″ long.—*D. chrysanthemifoliæ*, DC. (Abyssinica, C. H. Schultz) proxima, differt habitu rigido, caule simplici, foliis angustioribus rigidis acutius lobatis, et præcipue capitulis oblongis, involucro oligophyllo et receptaculo columnari.

The nearest ally of this is *D. chrysanthemifolia*, a native of Abyssinia and India.

4. **HELICHRYSUM (XEROCHLÆNA) MANNII**, *H.f.* Caule robusto villoso apice ramoso; foliis densissimis sessilibus, patulis demum reflexis, semi-amplexicaulibus oblongo-lanceolatis acutis integerrimis enerviis subtus marginibusque tomento appresso niveis, pedunculis basi capitulisque magnis albis v. pallide stramineis foliaceo-bracteatis, involucri squamis numerosissimis hyalinis splendentibus acuminatis.

Hab. In cacumine Clarence Peak, alt. 10,000 ped. (fl. Dec.)

Herba robusta, dense foliosa, pedalis et ultra, tomentosa. *Caulis* strictus erectus, teres, simplex, densissime foliatus. *Folia* 2″–3″ long., ⅔″-lata, acuta et apiculata, inferiora supra glabrata, inferne dense appresse lanata, superiora utrinque laxius lanata v. araneosa. *Capitula* subpaniculatim corymbosa, bracteis foliaceis fere tecta, expansa 1¼′ lata, pedunculis araneosis bracteolatis. *Involucri* squamæ perplurimæ, multiseriatæ, suberectæ, flosculis ⅕″ excedentes, apicibus acuminatis vix recurvis, externæ araneosæ, ceteræ glaberrimæ, internæ minores et angustiores late unguiculatæ, supra unguem purpureæ. *Receptaculum* convexiusculum, amplum, alveolatum. *Flosculi* numerosissimi. *Pappus* paucisetosus. *Corolla* anguste tubulosa. *Achænium* minimum glabriusculum.

A noble species, allied to *H. fœtidum*, but differing in the dense foliage, leaves less broad at the base, different form of inflorescence, which is more paniculate than corymbose, and much larger capitula.

5. Helichrysum (Xerochlæna) fœtidum, *Cass.*; *A. Rich. Flor. Abyss.* i. 426.

Hab. Ad Clarence Peak, alt. 10,000 ped. (fl. April.)

An extremely variable plant, native of Abyssinia, South Africa, Madagascar, and Mauritius, varying in breadth and tomentum of foliage, somewhat in size of the capitula, and much in their colour, from white to deep golden yellow.

6. Helichrysum (Chionostemma?) chrysocoma, *C. S. Schultz*; *A. Rich. Flor. Abyss.* i. 424. Var. *angustifolium*, gracile, foliis anguste lanceolatis acuminatis marginibus revolutis tomentosis v. superne glabratis; pappi setis albis.

Hab. Clarence Peak, alt. 10,000 ped. (fl. April.) *Herba* 4-pedalis.

I have examined several authentically named Abyssinian specimens of this plant, which present great variations in tomentum and breadth of foliage. The present differs from all in being rather more glabrous and slender, and smaller in foliage. The inflorescence, capitula, involucres, and florets are identical in all. The receptacle in all is covered with conical subulate elongate dark-yellow rigid bodies, that are persistent after the florets have fallen away. They are not noticed in A. Richard's work; these would refer this species to DeCandolle's section *Chionostemma*, were it not that the setæ of the pappus are quite free at the base. Richard describes the pappus as ferruginous, but it is white in all the Abyssinian specimens I have examined of Schimper's, and in the Fernando Po ones also.

7. Helichrysum (Achyrocline) Hochstetteri, *C. H. Schultz*; *A. Rich. Flor. Abyss.* i. 429.

Hab. Clarence Peak, alt. 8500 ped. (fl. Jan.) *Herba* 2-3-pedalis.

Mr. Mann's specimens are not a full flower, but the small size, great number and form of the capitula, the involucral scales, habit, tomentum, foliage and winged stems, leave no room to doubt that the present is identical with the Abyssinian plant, of which I have compared many specimens. The bruised capitula of the Abyssinian plant are aromatic, a character I do not observe in the Fernando Po, which are probably either too young, or, owing to the damp climate, deficient in aroma.

8. Helichrysum (Chionostemma?) globosum, *C. H. Schultz*; *A. Rich. Flor. Abyss.* i. 425.

Hab. Clarence Peak, alt. 10,000 ped.

Apparently identical with the Abyssinian plant.

9. Gynura vitellina, *Benth. in Niger Flora,* 438.

Hab. Fernando Po, ad 8500 ped. in Clarence Peak attingens. (fl. Dec.) First found in Fernando Po by Vogel, afterwards by Barter on the same island, and in Abyssinia by Dr. Roth. It is an instance of a mountain plant descending to the level of the sea at the base of the mountains, but not found elsewhere at the same level, on the African coast.

10. SENECIO (OBÆJACÆ) CLARENCEANA, *H.f.* Herbacea, erecta, glaberrima, caule folioso, foliis amplis patulis sessilibus lineari-oblongis, v. oblongo-lanceolatis obtusis basi auriculatis marginibus semipinnatifidis, lobis grosse dentatis, capitulis (½″ long.) corymbosis obconico-campanulatis gracile pedicellatis multifloris, involucri vix calyculati foliolis linearibus pedicellisque puberulis, flosculis omnibus tubulosis (sub 30–40), achæniis glabris.

Hab. Clarence Peak, alt. 9000 ped. (fl. Dec.)

Herba 2-pedalis, robusta, glabra nisi pedunculis pedicellis involucrisque puberulis. *Caulis* erectus, simplex. *Folia* 3″–5″ long., 1″ lat., subcarnosula, subtus pallidiora. *Corymbi* multiflori.

11. SENECIO (ARBORESCENTES) MANNII, *H.f.* Glaberrima, ramis apice foliatis teretibus cicatricatis, foliis breve petiolatis lanceolatis longe acuminatis dentatis costa nervisque subtus creberrimis pilosulis, paniculis terminalibus ramosis multifloris, ramis pedunculis pedicellisque gracilibus pubescentibus capitulis (⅓″ long.) angustis paucifloris, involucri squamis paucis erectis apice incurvis anguste linearibus basi bracteolatis.

Hab. Fernando Po, alt. 6000 ped. (fl. April.)

Arbor parva, 25′ alt., ramis crassiusculis. *Folia* spithamæa et ultra 1½″ lat., petiolo vix 1″ long., membranacea, utrinque concolora, juniora parce ferrugineo-tomentella, nervis crebris subhorizontalibus. *Panicula* longiuscule pedunculata, 6″ alt., ramis subelongatis. *Involucri* squamæ (sub 5) angustæ, medio herbaceæ, acute carinatæ, marginibus late hyalinis, apicibus incrassatis. *Flosculi* sub 6, achæniis glabris.

A handsome species, resembling some of the Indian mountain forms.

LOBELIACEÆ & CAMPANULACEÆ.

1. LOBELIA (TUPA) COLUMNARIS, *H.f.* Tota pubescenti-tomentosa foliis confertis sessilibus anguste lanceolato-oblongis acutis irregulariter denticulatis subtus dense tomentosis, racemo elongato conico densifloro, floribus dense pubescentibus.

Hab. Clarence Peak. (fl. Dec.)

Herba robusta, ut videtur 3–4-pedalis, dense foliosa. *Caulis* crassus, simplex, diam. digiti majoris. *Folia* 4″–6″ long., ¾″–1″ lat., erecto-patentia, nervis crebre reticulata. *Racemus* 8″–12″ long. *Flores* densissime imbricati, 1⅓″ long., angusti; alabastris cylindraceis, lente curvis. *Bracteæ* inferiores foliaceæ, flores subæquantes, superiores breviores. *Pedicelli* inferiores 1″ long. *Calycis* tubus hemisphæricus, lobis anguste lanceolato-subulatis, integerrimis, corollam triente brevioribus. *Corolla* lobis anguste ligulatis tubum æquantibus. *Staminum* tubus fere rectus, pubescens; antheris pilosis vix barbatis.

Closely allied to *Lobelia nicotianæfolia* of India. There are two Abyssinian allies, but no described South African, Mauritian or Madagascar.

2. **Wahlenbergia polyclada**, *H.f.* Hispido-pilosa, superne glabra, caulibus e collo numerosissimis basi decumbentibus demum erectis apice dichotome ramosis floriferis, foliis (parvis) sessilibus oblongo- v. ovato-lanceolatis acutis integerrimis undulatis, floribus parvis, calyce longe obconico, corolla brevissima capsula biloculari.

Hab. Clarence Peak, ad declivum orientem alt. 9000 ped. (fl. Dec.)

Herba radice gracili. *Caules* spithamæi ad pedalem, inferne et folia pilis hispidulis subcrispatis laxiuscule vestiti, superne divisi, glaberrimi gracillimi. *Folia* ¼″–⅓″ long., basi obtusa v. subcordata, margine lente recurva. *Flores* ⅓″ long.; calycis tubus anguste obconicus, lobis breviusculis, triangulari-lanceolatis. *Corolla* parva, cærulea, *calycis* lobos vix superans, an perfecta?

Not unlike *W. gracilis*, a very widely diffused Australian, Indian, &c. species, and of the same habit.

3. **Wahlenbergia arguta**, *H.f.* Glabra, caulibus gracillimis elongatis ascendentibus, apice pedunculos elongatos dichotome ramosos gerentibus, foliis sessilibus lanceolatis acuminatis argute serratis, floribus mediocribus, calyce brevissime obconico, corolla campanulata, capsula semisupera 3-loculari.

Hab. In Clarence Peak, alt. 8500 ped. (fl. Dec.)

Herba gracillima, caulibus flexuosis pedalibus parce vage ramosis. *Folia* ½″–¾″ long., basi angustata, marginibus tenuiter recurvis. *Pedunculi* 3–4-pollicares, superne dichotome divisi, ad axillas bracteati, bracteis subulatis. *Flores* ⅓″–½″ longi, suberecti. *Calycis* tubus brevissimus, lobis triangulari-lanceolatis, corolla pallide cærulea multoties brevioribus. *Capsula* trapezoidea semisupera.

The habit of this species is that of the St. Helena *W. angustifolia*, ADC, to which it is nearly allied, though the capsula is 3-celled.

Ericeæ.

1. **Leucothoe angustifolia**, var. β. pyrifolia, *DC. Prodr.* i. 603.

Hab. In Clarence Peak, alt. 8500 ped. (fl. Dec.)

Arbor 15–20-pedalis, corolla rufo-ferruginea.

Apparently identical with the plant of Mauritius and Bourbon; it also inhabits Madagascar. The flower and fruit vary a good deal in size.

2. Blæria spicata, *Hochst.*; *A. Rich. Flor. Abyss.* ii. 13.

Hab. In cacumine Clarence Peak, alt. 10,700 ped. (fl. Dec.)

Fruticulus pedalis.

This is identical with the Abyssinian plant. The genus was previously supposed to be confined to South Africa and Abyssinia.

3. **Ericinella Mannii**, *H.f.* Ramulis puberulis, foliis appressis glabris nitidis, pedicellis folia superantibus, sepalis superioribus corolla dimidio brevioribus, antheris muticis inclusis, stylo breviter exserto.

Hab. Clarence Peak, alt. 10,000 ped. (fl. Dec.)

Frutex 10-pedalis.

Extremely closely allied to the South African *E. multiflora*, Kl., and Madagascar *E. gracilis*, Benth., and almost intermediate between these, though quite distinct from both. It differs from *gracilis* in the pubescence, white stems and branches, longer pedicels and shorter sepals; from *E. multiflora* in the longer pedicels, erect leaves, muticous anthers and short style.

LOGANIACEÆ.

1. **Anthocleista scandens**, *H.f.* Caule tetragono, foliis petiolatis obovatis apiculatis, petiolis non alatis basi exauriculatis, corolla 12-mera, antheris fauce corollæ sessilibus.

Hab. Clarence Peak, alt. 5000 ped. (fl. Dec.)

Arbor scandens, 50-pedalis. *Ramuli* non spinosi. *Folia* 3″–4″ long., petiolo pollicari. *Calyx* fere 1″ long. *Corolla* 2″ expans. *Bacca* obovoidea, 2-pollicaris.

A very distinct species from *A. Vogelii* or *nobilis*, with flowers twice as large, leaves not half as large, sessile anthers, and a much larger berry.

GENTIANEÆ.

1. Sebæa brachyphylla, *Griseb.*; *DC. Prodr.* ix. 53.

Hab. Clarence Peak, 8500—10,000 ped. (fl. Dec.)

Herba 1–1½-pedalis, floribus flavis.

Appears identical with the Madagascar plant.

2. **Swertia Clarenceana**, *H.f.* Glaberrima, caule erecto anguste alato, foliis cordato-subrotundis obtusis margine recurvis, sepalis oblongis obtusis corolla dimidio brevioribus, corollæ lobis obovato-oblongis obtusis, staminibus 5, foveæ nectariferæ marginibus fimbriatis.

Hab. Ad cacumen ipsum Clarence Peak, alt. 10,700 ped. Exempl. solitarium. (fl. Dec.)

Herba 6″ alt. subrobusta, caulis alæ angustæ, interdum margine subglanduloso-denticulata. *Folia* ⅓″ long. *Flores* laxe cymosi, pro planta majusculi, fere ¾″ expans.

Very nearly allied to *S. Abyssinica*, but differs in more stout habit and much larger flowers.

MYRSINEÆ.

1. Mæsa Indica, *ADC.*; *Prodr.* viii. 80.

Hab. Fernando Po, alt. 5000 ped. (fl. Nov.)

Arbor parva, 15–20-pedalis.

This does not differ from the Indian plant, which is found from the Himalaya to Australia. It is also very similar to a Natal and East African species, with ciliated panicles. The *M. lanceolata* of Abyssinia differs more in texture and size than any floral characters.

LABIATÆ.

1. PLECTRANTHUS (COLEOIDES) GLANDULOSUS, *H.f.* Herbaceus superne glanduloso-pilosus, foliis petiolatis ovato-cordatis acutis grosse crenatis crenis crenulatis membranaceis, racemis laxe paniculatis, paniculæ ramis patentibus paucifloris, pedicellis gracilibus, corollæ defractæ labio inferiore porrecto saccato.

Hab. In Clarence Peak, alt. 7000 ped. (fl. April.)

Herba diffuse ramosa, 8-pedalis. *Rami* graciles, obtuse tetragoni, superne cum petiolis et inflorescentia glandulosi. *Folia* patentia longe petiolata, 3″-5″ long., 2″-4″ lat., supra glabra, subtus ad nervos pilosula, petiolis 2″-3″ long. *Panicula* ampla, laxa, divaricatim ramosa. *Verticillastra* pauciflora, floribus gracile pedicellatis in pedunculo communi gracili ternis. *Calyx* breviusculus, labio superiore brevi 1-lobo recurvo, inferiore longiore 4-fido lobis subulatis. *Corolla* cærulea, fere ⅔″ long., labio superiore reflexo, inferiore cymbiformi obtuso.

This has near allies both in South Africa, Abyssinia, Madagascar, and India: it differs from the technical character of the *Coleoideæ* in the pedicelled flowers.

2. PLECTRANTHUS (INDI) RAMOSISSIMUS, *H. f.* Pubescente-pilosa v. tomentosa, caule herbaceo erecto, ramis divaricatis, foliis petiolatis ovato-lanceolatis acutis crenatis utrinque pubescenti-pilosis, floralibus similibus sessilibus, cymis evolutis secus ramulos floriferos seriatim dispositis, pedunculis gracilibus apice ramosis 10-12-floris, calycibus villosis canis parvis, corollæ tubo pubescente recto.

Hab. In Fernando Po, alt. 5000 ped. (fl. Dec.)

Herba 6-pedalis, gracilis, divaricatim ramosissima, caulibus ramisque pilis subferrugineis sæpe deflexis vestitis. *Folia* 1½″-2″ longa. *Rami* floriferi 6″-10″ long. *Cymæ* pedunculi patentes, graciles, ½″-¾″ long., apice bracteas 2 patentes subulatas gerentes. *Flores* parvi, ¼″ long. *Calycis* tubus canus, basi hemisphæricus, ore obliquo contracto. *Corolla* calyce ter longior, alba, recta v. lente curva, lobis subæqualibus recurvis, genitalibus longe exsertis.

All the other African plants of this section (Cape, Madagascar and Abyssinia) belong to a group in which the cymes are crowded and nearly sessile, with the corolla tube defracted. The present is much more closely allied to several mountain Indian species.

3. Pycnostachys Abyssinica, *Fresen. Flora,* 1838, ii. 608.

Hab. Fernando Po, alt. 700 ped. (fl. Dec.)

Herba 8-pedalis, corolla violacea.

Judging from the short description of Fresenius in the 'Flora,' this is

certainly his plant. It differs from its very near ally *P. cærulea* of Abyssinia in the large flowers and calyx and dense pubescence; from the Cape *P. reticulata* in the petiolate and broader leaves.

4. Calamintha Simensis, *Benth. in DC. Prodr.* xii. 230.
Hab. Clarence Peak. alt. 8500 ped. (fl. Dec.)
Herba 2-pedalis, corolla purpurea.

This in no way differs from Abyssinian specimens, and is very nearly allied to the European *C. Acinus*, Benth.

5. STACHYS (STACHYOTYPUS) ACULEOLATA, *H.f.* Caule tenui procumbente elongato petiolisque retrorsum aculeolatis, foliis petiolatis ovato-cordatis obtusis grosse crenatis, verticillastris sessilibus sub 3-floris, floribus breve pedicellatis, calyce obconico subæqualiter 5-dentato lobis spinulosis, corolla tubo exserto, labio inferiore porrecto amplo trilobo lobo medio bilobo.
Hab. Clarence Peak, alt. 9000 ped. (fl. Dec.)
Herba parce ramosa, 1′–2′ longa. *Folia* distantia, 1″–1½″ longa, fere æquilata, petiolo pollicari. *Verticillastra* pauca, distantia, axillaria. *Flores* ½″ long., pallido purpurei tubo longe supra basin intus barbato, extus piloso. *Antheræ* divaricatæ.

This is the same with an undescribed Abyssinian species collected by Dr. Roth; but the stem is more slender, the petioles longer, the calyx rather smaller; I have no corolla in the Abyssinian specimen.

SOLANEÆ.

1. Solanum Indicum, *L.* Var. *micranthum.*
Hab. Fernando Po, alt. 6000 ped.
Frutex 6–8-pedalis, floribus albis.

Common throughout Tropical Africa, and probably not different from *S. Adoense* of Abyssinia.

ACANTHACEÆ.

1. Dicliptera maculata, *Nees.*? *A. Rich. Fl. Abyss.* ii. 158.
Var. Glanduloso-pilosa, floribus majoribus.
Hab. Fernando Po, alt. 5000 ped. (fl. Dec.)
Scandens 20-pedalis, corolla alba.

Apparently quite the same as the Abyssinian plant, but the flowers are either larger or owe their appearance of being so to better drying. In the Fernando specimens all parts are pilose and glandulose, in Abyssinian ones glabrous, but in A. Richard's character they are stated to be covered with cottony hairs. In the Fernando Po and one Abyssinian specimen the involucral leaves are quite obtuse and muticous, in another Abyssinian they are obscurely mucronate, and in a third ovate and pungent. Perhaps more than one species is included under this name.

SCROPHULARINEÆ.

1. Limosella aquatica, *L.* Var. *tenuifolia.*

Hab. Clarence Peak, alt. 9000–10,000 ped. locis humidis. (fl. Dec.,

This is an American, Australian, and South African form; the Abyssinian is the common European one, which also grows in South Africa.

2. VERONICA (VERONICASTRUM) MANNII, *H.f.* Caule e basi decumbente erecto simpliciusculo bifariam pubescente foliato, foliis sessilibus oblongo-lanceolatis remotiuscule serrulatis acutis, racemo terminali conferto glanduloso-tomentoso, staminibus corolla brevioribus, capsula orbiculata emarginata.

Hab. Ad cacumen Clarence Peak, alt. 10,700 ped. (fl. Dec.)

Herba gracilis, pedalis. *Caule* tereti basi radicante. *Folia* $\frac{2}{3}''$ long., subcoriacea. *Racemus* brevis v. elongatus. *Flores* breve pedicellati, cærulei $\frac{1}{3}''$ expans. *Calycis* lobi oblongi, obtusi, capsulam æquantes.

Very nearly allied to *V. glandulosa,* Hochst., of Abyssinia, but, as far as the several excellent specimens of both show, quite distinct in the narrow leaves and sepals, and bracts shorter than the flowers. It may well, however, prove to be a variety of that plant.

PLANTAGINEÆ.

1. PLANTAGO (LEPTOSTACHYS) PALMATA, *H.f.* Rhizomate perenni horizontali, foliis longe petiolatis late cordato-orbiculatis palmatim 5–7 lobis, spica gracili, capsulis dispermis.

Hab. Clarence Peak, alt. 8000 ped. (fl. Dec.)

Glabra v. parce pilosa. *Rhizoma* crassum, fibras rigidas demittens, collo brevi. *Peticli* 4″–6″ longi, glabriusculi, apice dilatati. *Folia* 2″–3″ long. et lat., membranacea, nervis radiantibus. Scapi petiolis subbreviores. *Flores* inter minores, laxe imbricati, basi laxe barbati. *Bracteolæ* et sepala consimilia obtusæ oblongæ dorso medio herbaceæ late scarioso-marginatæ, glabræ v. parce pilosæ. *Corolla* parva, genitalibus longe exsertis. *Capsula* calycem paulo superans. *Semina* viridia, crassiuscula, cymbiformia.

A very remarkable species in the form of the leaf.

SANTALACEÆ.

1. THESIUM (EUTHESIUM) TENUISSIMUM, *H.f.* Ramis e collo perplurimis ramulosis ramulisque gracillimis glaberrimis sulcatis, racemo ramoso, bracteolis 2 bracteam superantibus perianthio dimidio brevioribus ovato-subulatis, perianthii subcampanulati 4-5-fidi lobis inflexis exauriculatis, stylo stamina attingente, stigmate capitellato.

Hab. Ad Clarence Peak, alt. 9000 ped. (fl. Dec.)

Radix elongatus, teres, crass. pennæ corvinæ. *Rami* 4″–6″, gracillimi, angulati, squamulis minutis raris subulatis aucti. *Racemi* rami pauci breviusculi fasciculis sub 3-floris. *Bracteæ* et *bracteolæ* carinatæ obscure ciliatæ. *Perianthium* $\frac{1}{8}''$ long. obscure et obtuse angulatum, lobis breviusculis glaberrimis v. margine obscure ciliatis. *Filamenta* ori inserta, antheris duplo longiora.

Very nearly allied indeed to *T. Madagascarense,* A. DC., which is the only other species of this vast genus in which the bracteolæ exceed the bracts, and the stems are almost leafless. It differs remarkably from that plant in size, in the very numerous very slender stems and branches, and much smaller flowers.

THYMELEÆ.

1. **PEDDIEA PARVIFLORA,** *H.f.* Stamina ori perianthii inserta, ovarium apice villosum.

Hab. Fernando Po, alt. 5000 ped. (fl. Nov.)

Arbor 15–20-pedalis, floribus viridibus.—*P. Africanæ,* Harv., simillima, differt ramis gracilibus foliis magis membranaceis, floribus duplo minoribus, staminibus ori perianthii insertis, ovarioque apice toto villoso.

The only congener of this is a subtropical Port Natal tree.

URTICEÆ.

1. Parietaria Mauritanica, *Wedd.*

Hab. Clarence Peak, alt. 8000 ped. (fl. Dec.)

Herba 6-8 pedalis.

The bracts are decidedly ovate, though narrower than usual in this form which seems to pass into *P. debilis,* Forst.; it is described by Weddell as a Mediterranean and North African species.

EUPHORBIACEÆ.

1. **EUPHORBIA (ESULA) AMPLA,** *H.f.* Herbacea, glaberrima, foliosa; caule simplici superne patentim ramoso, foliis membranaceis petiolatis lanceolatis acutis subtus glaucescentibus, floralibus late ovato-cordatis v. triangulari-ovatis acuminatis, involucris solitariis laminis fimbriatis, glandulis semilinearibus cornubus brevibus.

Hab. In Clarence Peak, alt. 8500 ped. (fl. Dec.)

Herba 4-pedalis, caule crassiusculo, terete, inferne nudo. *Rami* patentes, conferti, spithamei et ultra, foliosi, terminalibus divaricatis. *Folia* 4″–5″ long., $\frac{3}{4}''$–1″ lat., integerrima, tenuiter nervosa, nervis divaricatis. *Involucra* sparsa, minima, solitaria. *Stamina* sub 8.

The habit of this species resembles *E. Lathyris,* but the whole plant is of a totally different texture; it is most near *E. monticola,* Hochst., of Abyssinia, but has not the involucral glands produced into subulate horns as in that plant. It is also allied to the Indian *E. Rothiana*; but in that the inflorescence is borne on peduncled special branches, and the involucres are numerous.

2. **CLAOXYLON (ATHROANDRA) MANNII,** *H.f.* Glaberrimum, gemmis

perulatis, foliis alternis petiolatis lanceolatis acuminatis irregulariter sinuoso-serratis basi biglandulosis, fl. masc. laxe paniculatis, gracile pedicellatis, perianthio late campanulato 4–5 fido lobis triangularibus valvatis, antheris numerosissimis in globum supra receptaculum aggregatis, fl. fœm. perianthio 2-lobo, glandulis 2-lobis alternantibus, ovario 2-loculari, stigmatibus elongatis.

Hab. Fernando Po, alt. 5000 ped. (fl. Dec.)

Frutex 15-pedalis, ramis fragilibus teretibus. *Gemmæ* in axillis foliorum brevibus squamulis late obovatis rigide coriaceis pallidis nitidis tectæ. *Folia* spithamæa, membranacea, basi 3-nervia, petiolo pollicari. *Racemi* axillares et cum ramulis e gemmis orti, petiolis breviores v. æquilongi, pedunculo gracillimo, floribus paucis subcorymbosis gracile pedicellatis, pedicellis ¼″–⅓″ long. *Alabastra* late ovoidea. *Flores* virides, ¼″ diam. *Antheræ* numerosissimæ, sessiles, squamulis non immixtæ, loculis globosis. *Fl. fœm.* parvi, perianthii lobis parvis minutis oblongis. *Styli* recurvi, elongati.

A very singular plant, probably generically distinct from *Claoxylon*, from all other species of which the perulate buds abundantly distinguish it. A very similar species was found in the Niger by Barter.* The structure of the flower agrees with the character of *C. cordifolium*, Benth., but in that the anthers are sessile. The name of *Athroandra*, signifying crowded stamens, will serve to distinguish these species whether as genus or section.

COMMELYNACEÆ.

1. Cyanotis Abyssinica, *A. Rich.*? *Flor. Abyss.* ii. 344.

Hab. Clarence Peak, alt. 9000 ped. (fl. Dec.)

A fine species, remarkable for its round tuberous roots, the size of a hazel nut. It may be the same with a Madagascar and South African species, but the extremely fugacious flowers are very difficult of analysis, and judging from dried specimens, I hardly think them the same.

ORCHIDEÆ.

[*By Dr. Lindley.*]

1. Calanthe, sp. nov.? C. Natalensi, *Reich.*, proxima.

Hab. In Clarence Peak, alt. 6000 ped.

Herba 1½″ alt. Corolla alba et purpurea.

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* *Claoxylon* (*Athroandra*) *Barteri*, H. f. Glabrum, gemmis perulatis, foliis ovato-lanceolatis abrupte acuminatis crenatis junioribus pilosis basi eglandulosis, fl. masc. parvis in pedunculum brevem gracilem sessilibus v. pedicellatis, perianthio 4-lobo, lobis valvatis, antheris ut in *C. Mannii*. *Fl. fœm.* stigmatibus parvis.

Hab. Flum. Niger ad Gomba, Eppah et Lagos,—beat. *Barter*. *C. Mannii* arcte affinis, differt foliis latioribus, parvis, 1″–2″ long. obsolete acuminatis basi non biglandulosis, floribus multoties minoribus et stylis brevibus.

2. Habenaria, sp. nov. H. peristyloides, *A. R.* (Abyssiniæ) et *H. præaltæ Thouars* affinis.

Hab. Ad cacumen Clarence Peak.

3. Polystachya?

Hab. Clarence Peak, alt. 6000 ped.

Epiphytica, species singularis et distinctissima. *P. capensi,* Sond., et *Ottonianæ,* Reichb., habitu similis.

4. Bolbophyllum, sp. nov.

Hab. Clarence Peak, alt. 5000 ped.

Epiphytica, *B. flavido* (Sierra Leone) affine.

JUNCEÆ.

1. Luzula campestris, *L.*

Hab. Ad cacumen Clarence Peak, alt. 10,700 ped. (fl. Dec.)

I have seen no other Tropical African specimens of this plant, nor is any species of the genus mentioned in Richard's 'Flora of Abyssinia.' There is, however, a very similar plant in South Africa.

CYPERACEÆ.

1. Carex Boryana, Schkuhr. Forma spica depauperata. (*Boott.*)

Hab. Clarence Peak, 8500 ped. (fl. Dec.)

Dr. Boott, who has identified this and the following for me, observes that he has a similar form from Bourbon, of which isle and Abyssinia this is a native.

2. Carex Wahlenbergiana, *Boott.* Illust. Carex, t. 301.

Hab. Clarence Peak, alt. 8000 ped. (fl. Dec.)

Of these specimens Dr. Boott remarks, that it has pale spikes, and shorter narrower bracts and leaves than the fully developed plants; but that he has the same pale spikes and narrow (but longer) leaves in Bourbon specimens. It is also a native of Mauritius.

3. Kyllingia macrocephala, *A. Rich. Flor. Abyss.* ii. 491.

Hab. Clarence Peak, alt. 8500 ped. (fl. Dec.)

I am very doubtful if this is anything but a form of the ubiquitous *K. monocephala*: the scales are however larger and of a somewhat different shape. Stamens 2.

4. Isolepis trifida: cf. T. pusilla, *Hochst.*, et T. gracillima, *Hochst.*

Hab. Ad cacumen Clarence Peak, alt. 10,700 ped. (fl. Dec.)

A common Indian plant, extending westward to Abyssinia and Senegal, and eastward to China.

5. SCHŒNUS? ERRATICUS, *H.f.* Pusillus, glaberrimus, rigidulus, caule basi bulboso, foliis filiformi-setaceis rigidis curvis supra canaliculatis subtus convexis, culmis nudis curvis filiformibus sulcatis apice monocephalis, capitulo ovoideo compresso e spiculis 1–3 piceis compressis

composito, involucro 1–3-phyllo spiculis breviore, foliolis ovato-lanceolatis acuminatis dorso carinatis, spiculis 5 8 lineari-oblongis compressis vix distiche imbricatis.

Hab. Clarence Peak, alt. 9000 ped. (fl. Dec.)

Herba 3–6-uncialis, culmis basi subbulbosis folia longe superantibus. *Folia* 1–2 pollicaria sulcata, acuminata, vix $\frac{1}{4}'''$ diam. vaginis brevibus rufis non nitentibus. *Capitulum* $\frac{1}{2}''$ long. *Spiculæ* confertæ, lineari-oblongæ, squamæ sub 8–10, infimæ paucæ latiores vacuæ, cæteræ subæquilongæ, oblongo-lanceolatæ, acutæ, vix carinatæ, opacæ, glaberrimæ. *Stamina* 3, discus et setæ hypogynæ 0. *Ovarium* parvum oblongum trigonum, stylo gracili basi simplice, stigmatibus 3 filiformibus.

I am doubtful of the genus of this plant; the scarcely distichous scales of the spikelet differing from *Schœnus*, to which it is otherwise referable. The scales are, however, not always regular in *Schœnus nigricans*, and in *Chætospora*, which must surely be reduced to *Schœnus*, the scales are sometimes imbricated all round. A. Richard's *Hemichlæna bulbosa*, to which this is a good deal allied, has distichous scales, but this plant differs materially from *Hemichlæna* in wanting the disk. I do not see how it differs from *Cyperus*, with many species of which it further agrees in the margins of the scales decurrent on the rachis.

GRAMINEÆ.

1. Deschampsia cæspitosa, *P.B.* *D. latifolia*, Hochst.; A. Rich. Flor. Abyss. ii. 413.

Hab. Clarence Peak, alt. 10,100 ped.

Also found in Abyssinia and most other temperate parts of the globe, but not hitherto in South Africa.

2. Trisetum lachnanthum, *Hochst.*; *A. Richard. Flor. Abyss.* ii. 416.

Hab. Clarence Peak, alt. 7900–9000 ped. (fl. Dec.)

A very distinct species, closely allied to *T. virens*, Nees, of the Indian mountains.

3. Festuca Schimperiana, *A. Rich.* *Flor. Abyss.* ii. 433.

Hab. Clarence Peak, alt. 8500 ped. (fl. Dec.)

The spikelets are rather larger than in the Abyssinian specimens, but the species is evidently the same.

4. Brachypodum sylvaticum, *R. & S.*

Hab. Clarence Peak, alt. 7000 ped.

A native of Abyssinia (*B. flexum*, Nees).

5. Gymnandropogon, sp.? (*Schimper, Plant. Abyss.* 1853, No. 1006.)

Hab. Clarence Peak, alt. 9000 ped. (fl. Dec.)

This, which approaches very closely *A. glabriusculus*, Hochst., of Abyssinia, further seems identical with another and perhaps undescribed species of that genus, collected by Schimper, and quoted above.

Note on an unusual mode of Germination in the Mango—*Mangifera Indica.* By MAXWELL T. MASTERS, Esq., F.L.S.

[Read April 4th, 1861.]

IN the Museum of the Royal Gardens at Kew, are preserved two specimens of the Mango in an advanced stage of germination, which present some peculiarities that may be deemed worthy of bringing under the notice of the Society. For the opportunity of examining and describing these curious plants, I am under great obligations to Dr. Hooker, and to Mr. Jackson the curator of the Museum. From these gentlemen I learn that the seeds in question were sent home by the late Mr. Barter, when accompanying Dr. Baikie on his second Niger Expedition in 1857, and were reared by Mr. Crocker at Kew.

From the appearance that these young plants presented on cursory inspection, and perhaps from the knowledge that the seeds of the Mango are occasionally poly-embryonous, the specimens were described in these words, "one mango seed producing many plants." The closer examination which I have been enabled to make leads me to conclude that there are, in reality, two seeds, presenting such peculiar appearances, especially when placed, as they were, in close apposition one to the other, as readily to give rise to the opinion before expressed. This will be understood at once by the circumstance of there being only two cotyledons present, from between which a great number of shoots apparently emerge. In one of these two seeds (*fig.* 1.) one cotyledon is present, though partly decayed and truncated at its upper part, possibly by some accident during growth; the other seed-leaf is absent, but there is a scar distinctly visible, indicating its original position. The plumule presents itself as a long, thick, fleshy, curved body, presenting no trace externally of leaves or buds; in the axil of the cotyledon, between it and the plumule, arises a leaf-bearing shoot, presenting no unusual features. The radicle is thick and tapering, and gives off a few slender rootlets. The second seed (*fig.* 2) is likewise deprived of one of its cotyledons, but the scar remains to attest its former presence. From the appearance of the tissues in the immediate vicinity of the scar, the missing seed-leaf seems to have perished from some cause inducing gradual decay, rather than from any injury or traumatic cause, to use a surgical expression. The existing cotyledon is oblong, oblique at the base, the outer surface convex, wrinkled on the upper half, while the lower half is scooped out and smooth like the inside of a shell. From this portion proceed

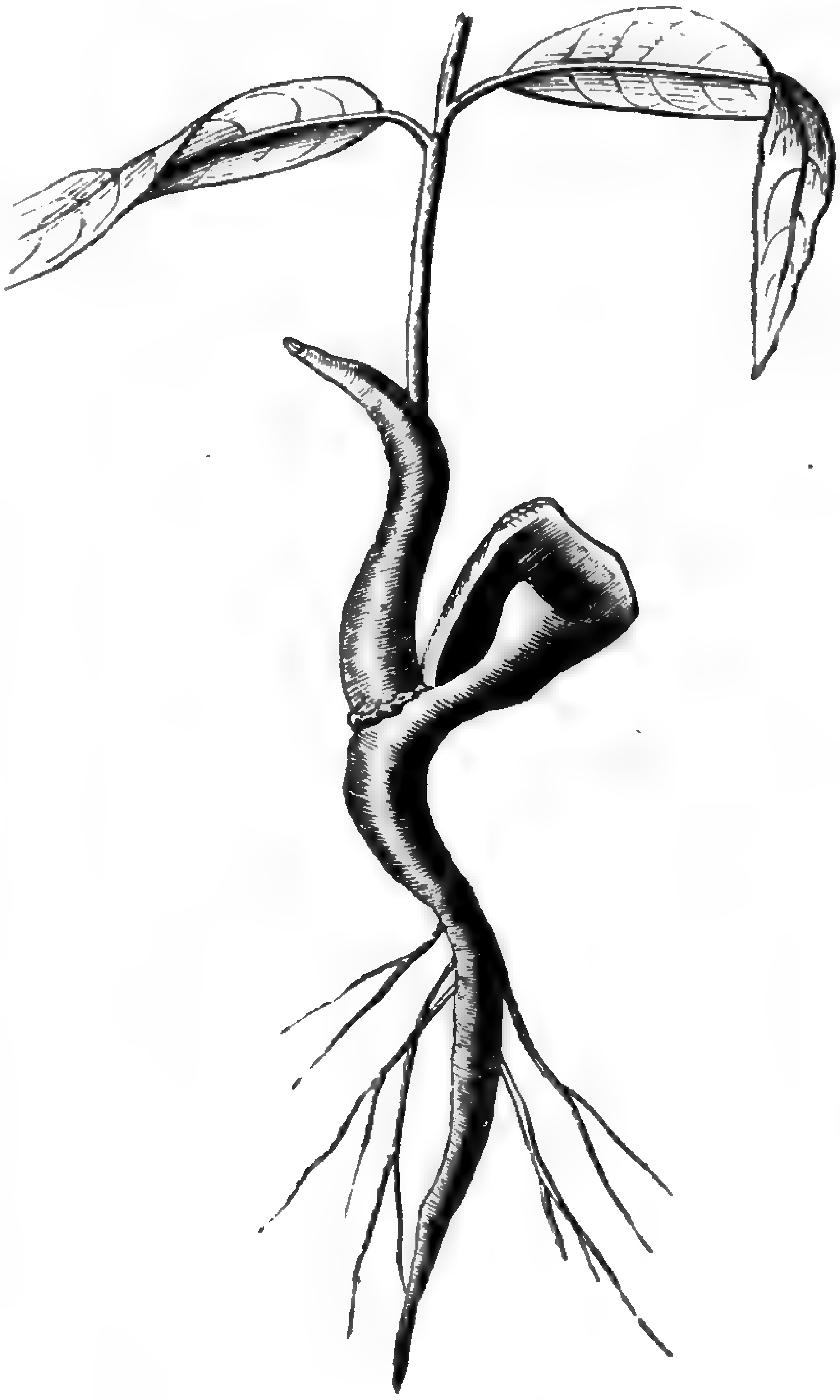

Fig. 1.

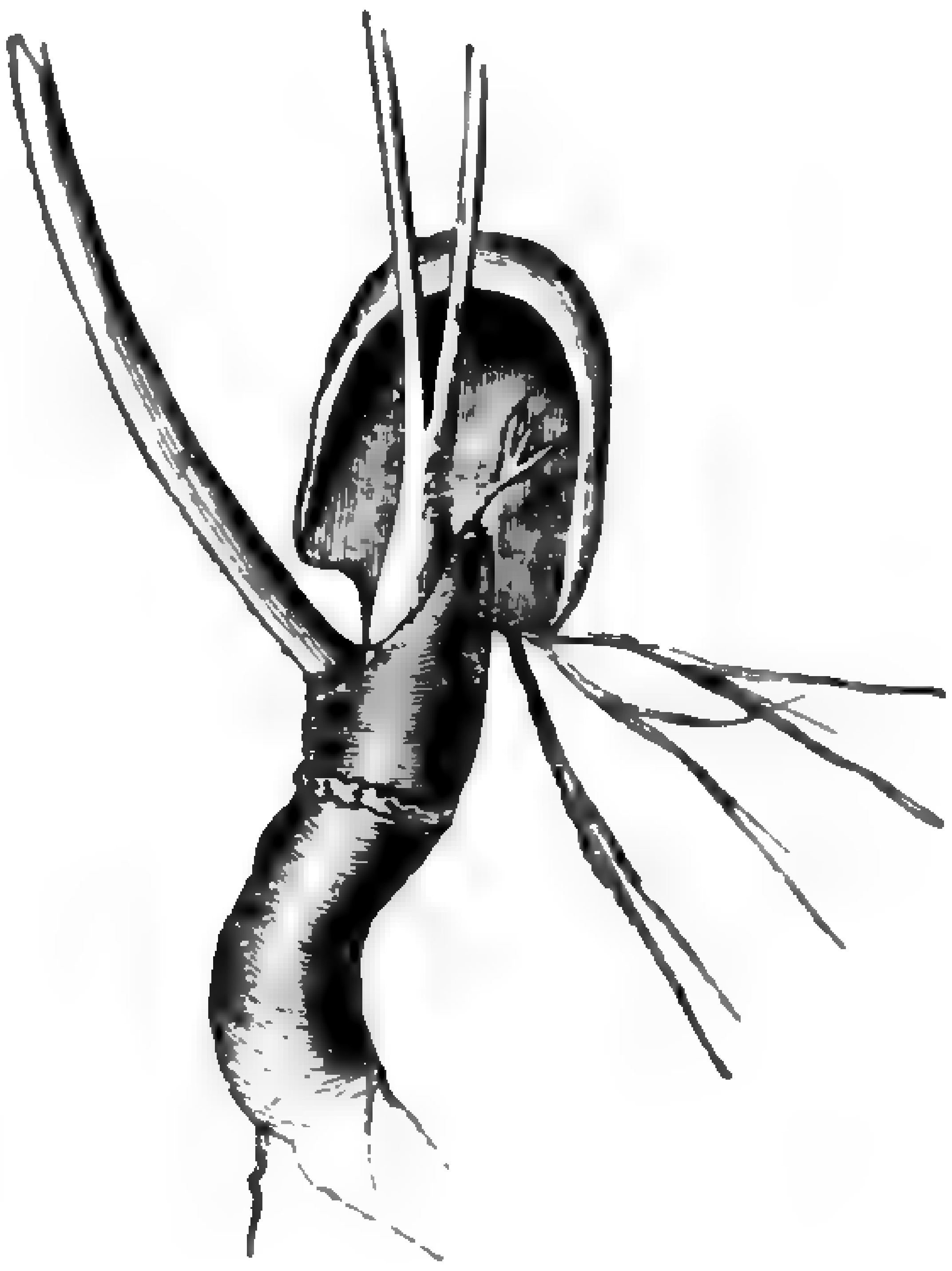

Fig. 3.

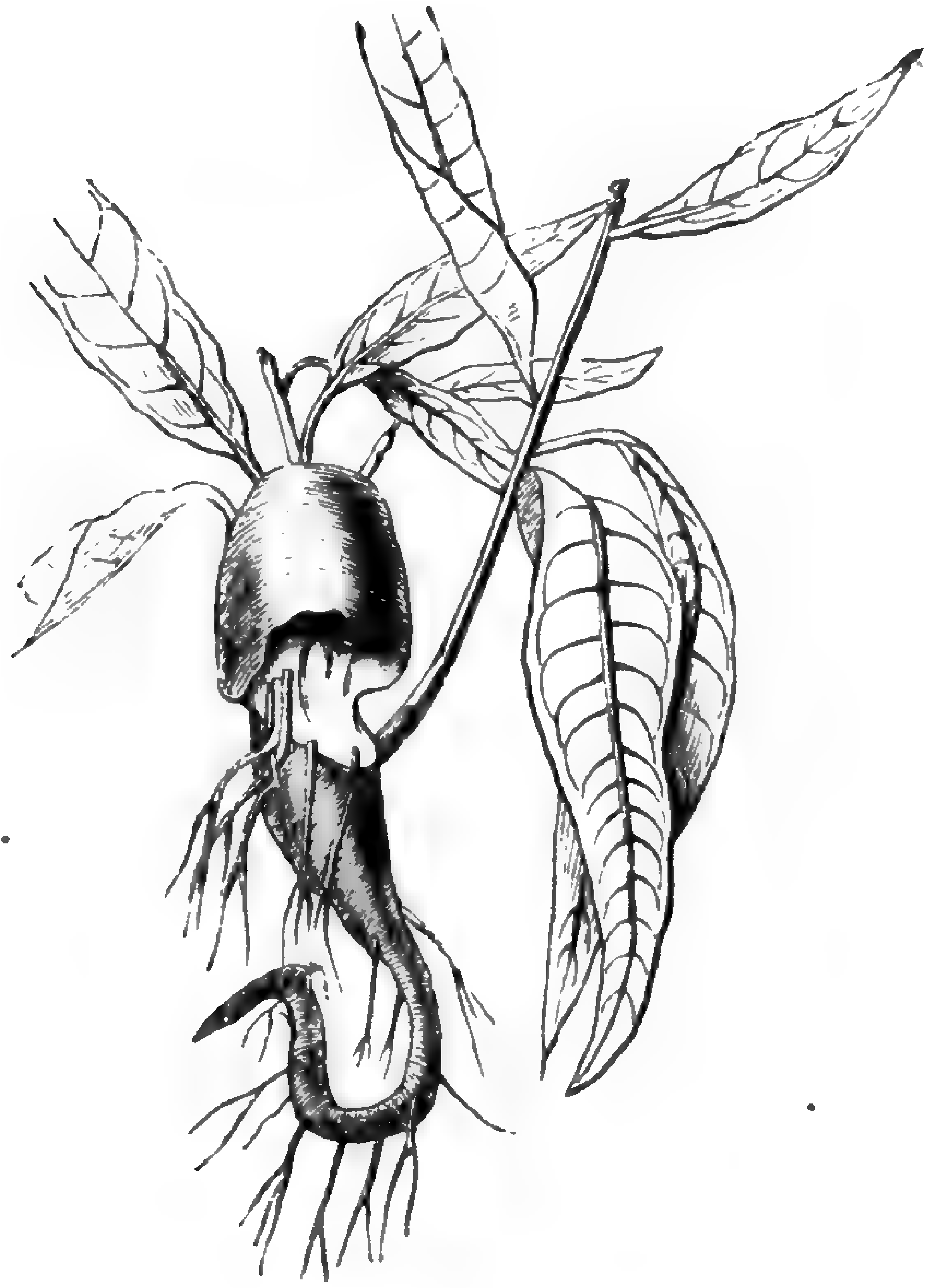

Fig. 2.

Fig. 2 outer
Fig. 3 inner } aspect of same seed. See reference on other side.

a number of adventitious roots. The inner surface (fig.3) is concave, and offers no unusual appearance; the plumule in this instance is short, thick, fleshy, conical, and gives off, not from its summit, but from its side, some distance above the attachment of the cotyledons, three leafy shoots, one of which is small and but slightly developed, and another is divided into two branches a short distance above its origin. The radicle has a similar appearance to that of the first-mentioned seed.

To sum up the peculiarities presented by these specimens, there is, first, the entire absence of one of the cotyledons in both instances; next, the peculiarity of the plumule, in the one case giving off no shoot at all, in the other giving rise to three shoots from its side; and, lastly, there is the production of adventitious roots from the "scooped-out" portion of the cotyledon.

I do not know any instance of plumules presenting the peculiarities just mentioned, nor have I been able to find on record any case of adventitious roots springing from the cotyledons themselves, though there is no physiological or anatomical reason why, under certain circumstances, adventitious roots should not be developed in such a situation. Irmisch indeed describes similar rootlets arising from the petiole of the cotyledon in *Bunium creticum* and *Carum Bulbocastanum*[*].

The scooping out of the lower half of the outer surface of the cotyledon may not be an unusual occurrence in mango seeds, though it is certainly not invariable. Griffith describes the cotyledons of this plant as oblique at the base, with half of their outer surface wrinkled, half smooth, sometimes auricled, sometimes not, sometimes of different sizes. The plumule he describes as "stalked and well-marked." Gaertner figures seeds of this plant with apparently lobed cotyledons, the lobes being, as Reinwardt[†] shows, really separate seed-leaves belonging to distinct embryos; but the descriptions given by these writers by no means apply to the cases I have attempted to describe; nor does Alexander Braun, in his recently published memoir on 'Polyembryonous Plants,' among which mention is made of the Mango, describe anything like them.

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[*] Flora, 1858, pp. 33-42.

[†] Reinwardt, Nov. Act. Acad. Car. Leop. Nat. Cur. 9-24, 4to, 12, 1, 37.

Reference to the Woodcuts.

The figures are one half the size of the originals; Nos. 2 and 3 refer to the outer and inner aspect of the same seed respectively, but the details of the foliage, etc., are omitted in No. 3.

Account of the Ascent of Clarence Peak, Fernando Po, altitude 10,700 feet. By Mr. GUSTAV MANN, Botanist to Dr. Baikie's Niger Expedition. In a Letter to Sir W. J. HOOKER, F.R.S., F.L.S., &c., and communicated by him.

[Read March 7, 1861.]

SIR,—As I informed you already in my letter before last, that I did not succeed at my first trial in ascending the mountain, I will give you now an account of my second trip, which was successful. On the 23rd of March I left Clarence for the second time, and commenced my ascent from here, keeping first eastwards and then turning south, and attaining the first day a height of 1300 feet. After I had passed two large Boobee towns, Barapa and Basile, finding the vegetation already quite different, I stopped to collect the few plants in blossom, and some nice Ferns, especially Trichomanes and Aspleniums. The trees were much overgrown by Orchids, Ferns, and Begonias, while moss hung a foot in length from the branches: there was in consequence much dry wood at the top of the trees. There were no Palms, nor herbaceous plants 15 feet high, as in the lower part. The temperature here in the mornings was 64°, at noon 70°, and in the evenings 66° Fahr. At about 1000 feet up I found the fine large Trichomanes growing on the ground, and the large Acrosticum?: these I sent in the Wardian case, and have dried specimens of both still here.

On the 27th of March I ascended to a height of 5000 feet: during this ascent I found the fine Cyathea. This species seems to form larger groups than other Cyatheas do, many averaging from 10–15 trunks, some of which rise to a height of 30 feet. The Onychium? of which I sent a specimen in the Wardian case, grows only as an epiphyte on this tree-fern. I also found on this ascent the fine Antrophyum?, resembling the Platycerium of the tropical part of the island; and the Liliaceæ, of which I sent six bulbs; and the Calanthe like Veratrifolia. All the Trichomanes grew between 1000 and 5000 feet. At this height I stopped one day, and ascended on the 28th to a height of 6000 feet, and on the 29th to 8500 feet; up to which height I found very little difference in the vegetation. From this place I was obliged to send a Krooman down to fetch more provisions, which, together with daily rain, obliged me to remain here six days. During this time I was compelled to sleep on the wet ground, placing my blanket and other things under an oil-cloth when the rain commenced at night, and selecting for myself a dry place where the rain did not come through the small roof of palm-leaves. This, under a temperature of 42° Fahr. at night, was a trial to my health; but one must learn everywhere, and I have learnt a great deal since I came here. The vegetation here consists mostly of herbaceous plants, as Gramineæ, Salvia, Rubus, &c. The largest trees here (50 feet high) are Araliaceæ and Compositæ. On the 3rd of April I reached the top, about two o'clock in the afternoon. Unfortunately a storm of rain and hail spoilt the enjoyment with which I should otherwise have seen the whole island spread out before me; but what was worse than this, I found the entire summit burnt, and no vegetation except grass, which was just beginning to sprout. This is done by the Boobees, to drive the deer to the lower part of the island. I did not meet with a Boobee above 1000 feet elevation. The top is formed by the highest side of the largest crater, which is about 40 feet deep. There is good and deep soil up to the top, and only on the inside of the largest crater are a few rocks visible. Lower down there are more small craters. At this time the temperature was 54° F., and the minimum at night 39° F.

Shrubs grow to between 400 and 500 feet of the top, and amongst them I found an Erica 8–10 feet high, which gave me much pleasure. I regret very much that I could not stop some days longer, but I ran the risk of making myself a cripple for life; I therefore commenced my descent on the 4th. Again it was too late in the season, for which reason very few plants were in blossom.

At the bottom of the highest part I found a small lake, perhaps only the result of the very heavy rain of the last few days. The large Hypericum forms the greatest part of the bush, and has a very pretty appearance from its fine light-green foliage. The first day I descended to 5000 feet, and on the 5th I went down to 1300 feet, where I remained six days, making excursions in different directions. The tree-fern and other living plants were collected the day before I set off on my return to Clarence, which place I reached on the 13th of April, and immediately commenced the arrangement of my plants, &c., being anxious to send away my collections by the last mail. After coming down from the mountain I needed a little rest, but having this work before me, I rather overworked myself, and took fever, which was the reason why I did not write to you by the last mail. I should be very glad to hear how the plants and specimens reached Kew, and if all was done to your satisfaction. It would also give me much pleasure if I heard that there was anything new among them. Yesterday I obtained a fruit spike of *Raphia vinifera*, 6 feet long, and so heavy that two men could scarcely carry it. Raphia is scarce on this part of the island, but is more abundant on the eastern side, because that part is lower, and this palm prefers a low swampy situation. It is much used, all the houses being roofed with its leaves. Next time I will send you some mats made from it, as they may be of interest for the Museum. At the north-west bay of the island an excellent sort of yam grows, quite like a good potato; on the eastern side they grow much larger, but are not nearly so good in quality. On the eastern side I also found good cotton, growing quite wild, and only gathered by the people when they have nothing else to do.

The whole island is uncultivated, with the exception of a small part near Clarence, for the yam-fields can scarcely be considered as cultivation. From February until now is the active time of year. In February the Boobees plant their yams, and in March the palm-oil season commences: the men bring home the nuts, and the women make and sell the oil. The island would yield ten times as much palm-oil, if the Boobees would make use of all that is growing; but these people have so few necessaries of life that they are not to be depended on.

To ascend the mountain one needs a good oiled tent with a hammock, and tin boxes to put everything in: an hour after I had dried my plants by the fire they were wet again, and I had therefore great difficulty in preserving them. It also requires at least six Kroomen to assist in the dry season. I have now quite recovered my health, and hope shortly to benefit by change of air when the ship goes up the river. I never thought that the difference of climate on the mountain and here would have had so much effect on me. On the mountain I enjoyed good health, except that I took a bad cold, from not having a sheltered place at night. By this mail I expected instructions from the Foreign Office, since till now I have received none at all, except that money has been granted to live on, and to go up the mountain, and for one Krooman to assist me. If the Expedition goes up the Niger again (which is doubtful), the collections will be entirely different.

I enclose a little sketch of the Consulate, thinking it may be of interest to you. Consul Hutchinson and his lady are going home to England; I shall thus lose a very kind friend, who has been like a brother to me. I heard from Mr. Hewen that you had inquired if it were possible to ascend the mountain of Bimbia or Cameron. You will hear shortly that it is quite impossible, and only killing men to send them up there; this, however, was also told me before I went up Clarence Peak. It is, no doubt, *very* difficult, but it is possible; only too much must not be expected from the first trip. Much might be gained by a second ascent; as would also, I think, be the case, if I could ascend the Peak here again, and remain there for some months during the dry season. To stop there in the wet season is quite impossible, and would be certain death.

GUSTAV MANN.

Clarence, Fernando Po,
May 31st, 1860.

On the Discovery of *Carex ericetorum*, Poll., as a Native of Britain. By CHARLES C. BABINGTON, M.A., F.R.S., F.L.S., Professor of Botany in the University of Cambridge.

[Read June 20, 1861.]

SEVERAL months since my friend Mr. John Ball, F.L.S., sent to me a specimen of *Carex*, gathered by him on the Gogmagog Hills in Cambridgeshire in the year 1838, and upon a careful examination of my Herbarium I found four specimens of the same plant, gathered at the same place on May 3, 1838, and probably in company with Mr. Ball. This plant was supposed by Dr. Boott to be the *C. ericetorum*, Poll. On referring to my notes I was enabled to ascertain the places visited on the above-mentioned day, and have lately revisited them more than once. At length, on Mav 28, 1861, I was so fortunate as to rediscover a single rather large patch of the same *Carex*, growing on the grassy slope of the Roman road, locally called the Wool Street, at about four miles and a half from Cambridge, and probably not far from the spot where it was gathered in 1838.

As I have now no doubt of its being the *C. ericetorum*, and a true native of the country, I venture to announce it as an addition to the British flora. This is no "split" from a recognized species, but a plant allowed by botanists to be a true species. At first sight it much resembles *C. præcox*, and inhabiting similar ground, may have been overlooked in many places. To the practised eye it has a decidedly different appearance when growing;

for the white edge of the scales of both kinds of its spikes gives it a silvery look very different from the dark hue of the *C. præcox.* The place where it grows is chalky and very dry, and there is an abundance of *C. præcox* in its neighbourhood. Although I have as yet only met with one patch of it, its restriction to that one spot is highly improbable; but unfortunately the chalk district of Cambridgeshire is so universally under the plough that few fit places for its growth now remain. It should be carefully looked for in similar places elsewhere in the south-east of England.

It may be known by the following characters:—Its fertile spikes are more ovoid and closer together than those of *C. præcox*; its glumes obovate, very blunt, with a pale margin, which is finely ciliated, especially at their tip; their midrib does not reach to the tip; its fruit is obovate. The nut I have not been able to examine, owing to the young state of the fruit. My specimens are about 3 or 4 inches high.

It is the *C. ericetorum* of Pollick (*Fl. Palatin.* ii. 480. A.D. 1777) and of other authors, the *C. ciliata* of Willdenow (in *Act. Berol.* for 1794. p. 47. t. 3. fig. 2) and others. The latter name would be much more characteristic of the plant, but the dates of publication conclusively determine that Pollick's name must be adopted.

On some Species of Oaks from Northern China, collected by W. F. Daniell, Esq., M.D., F.L.S. By William Carruthers, Esq., F.L.S.

[Read June 20th, 1861.]

On returning from the late expedition to China, Dr. Daniell placed in my hands the specimens of several oaks which he had gathered on the shores of Taliewhan, a bay running into Southern Manchouria, to the west of the Corea, and chiefly in a small valley about a mile from the sea, where they grew mixed with *Pinus densiflora*, Sieb., *Salix Babylonica*, L., &c. The specimens belong to six species, three of which are new and undescribed. Two of these species, however, want flowers and fruit, and although remarkable in the shape and characters of their leaves, and different from anything hitherto noticed, I have not ventured to name and describe them from the foliage only. I have added a fourth species which I found among the plants, now in the Herbarium of the British Museum, brought home by Sir George Staunton from Northern China.

All of them, in which the fruit is known, belong to Blume's section of the genus characterized by the acorn cup having imbricated scales, and named by Endlicher *Lepidobalanus*. They are

1. Q. obovata, *Bge.*
2. Q. Mongolica, *Fisch.*
3. Q. McCormickii, n. sp.
4. Q. serrata, *Thunb.*
5. Q.—sp.?
6. Q.—sp.?
7. Q. acuminatissima, n. sp.

1. Quercus obovata, *Bge. Mem. St. Petersb.* vol. ii. p. 136.
Hab. From Taliewhan, *Dr. Daniell*; and between Pekin and Jehol, *Sir George Staunton.*

2. QUERCUS MONGOLICA, *Fisch*; *Ledebour Flora Rossica,* vol. iii. p. 589. Foliis petiolatis vel subsessilibus obovatis, basi auriculata sinuato-lobata, a medio ad basin cuneato-attenuatis sinuato-lobatis, lobis sursum versis subacutis muticis a medio utrinque decrescentibus, sinubus acutis, subtus glaucis glabris; cupula squamis adpressis gibbosis sericeis muricata, squamis superioribus parvis cupulam non excedentibus; nuce ovata cupulam duplo excedente styli basi apiculata.
Hab. From Taliewhan, *Dr. Daniell*; and between Pekin and Jehol, *Sir George Staunton.*

From the fine specimens given me by Dr. Daniell I have slightly amended the character of this species: this was the more needed to separate it clearly from the following.

3. QUERCUS MCCORMICKII. Foliis breviter petiolatis obovatis, basi lobata, a medio ad basin cuneato-attenuatis sinuato-lobatis, lobis sursum versis rotundato-obtusis muticis a medio utrinque decrescentibus, sinubus acutioribus, subtus glaucis, glabris vel rarius subtus ad venas pilis raris obsitis; cupulæ squamis externis triangulatis sericeis, internis membranaceis lineari-lanceolatis margine et apice ciliatis cupulam valde excedentibus; nuce rotundata cupulæ squamas vix excedente styli basi apiculata.
Hab. From Taliewhan, *Dr. Daniell.*

The difference between the foliage of this species and the preceding is so trifling, that, but for the fruit, it would be difficult to separate them. The shape of the acorn, and especially the scales of the cup, however, supply obvious and striking peculiarities. Instead of the compact scales of *Q. Mongolica,* Fisch., the cup is nearer that of *Q. obovata,* Bge.; but the scales are more compact, shorter, and more erect.

4. Quercus serrata, *Thunb. Flor. Jap.* p. 176.
Hab. From Taliewhan, *Dr. Daniell.*

5. Quercus, sp.
Hab. From Taliewhan, *Dr. Daniell.*

This is a shrub, growing to the height of 6–10 feet. It appears to be nearly related to *Q. serrata,* Thunb., both having the leaves glabrous above and glaucous below, from a compact covering of small white hairs, and having also the veins running out into setæ; but the uniform obovate shape of the leaves, and the almost entire absence of the petiole (scarcely exceeding a line in length, as opposed to an inch in *Q. serrata,* Thunb.) strikingly separate it from that species.

6. Quercus, sp.

Hab. Taliewhan, *Dr. Daniell.*

This is also a dwarf oak, from 6 to 10 feet high. It differs from *Q. Chinensis,* Bge., which seems to be its nearest ally, in wanting the glaucous or canescent covering on the under surface of the leaf (both sides being equally glabrous, and nearly of the same colour), and in the remarkable panduriform shape of the nearly sessile leaf. The petiole is 1–2 lines long.

7. QUERCUS ACUTISSIMA. Foliis petiolatis, e basi rotundata vel obtusiuscula ovato-lanceolatis acutissimis serratis, serraturis setaceo-excurrentibus, venis et setis sursum spectantibus glabris; fructibus breviter pedunculatis; cupulæ squamis sericeis, externis parvis, internis elongatis subulatis cupulam excedentibus.

Hab. Chinese province of Kiangsi, *Sir George Staunton.*

The form of the leaf separates this species from the last, and the glabrous under-surface as well as the remarkable difference in the fruit separate it from *Q. serrata,* Thunb., under which name specimens of it have been distributed by Dr. Asa Gray. The veins and the setæ are directed more upwards than in the allied species. The petiole is 5–8 lines long.

On the identification of the Grasses of Linnæus's Herbarium, now in possession of the Linnean Society of London. By Colonel WILLIAM MUNRO, 39th Regt., C.B., Chevalier of the Legion of Honour, F.L.S., &c.

[Read April 4th, 1861.]

I BEG to offer to the Linnean Society, as the envied possessors of the original authenticated collections of Linnæus himself, the accompanying notes on the identification of the various grasses contained in his Herbarium.

Hoping that ere very long I shall be able to offer to botanists a full account of all grasses at present known in collections, I have devoted considerable time to the identification of the species of the earliest authors, with the view of clearing up some of the numerous mistakes in synonymy, which add so very much to the labours of any systematic botanist who wishes to treat any natural order in a really scientific spirit. Amongst grasses I find the errors extraordinarily numerous. Many of these might have been avoided by consulting herbaria easily accessible; and very many might have been avoided by a little care, and less anxiety for the creation of species. With many, a difference in locality seems to have been quite sufficient reason for giving a different specific name. This idea was not consequent on following in Linnæus's steps. In the comparatively few mistakes he has made, he has erred in the contrary direction, and placed in one species two or three very different plants. In another respect Linnæus's example might have been well followed. He had great regard to the priority of names; and although he was the first to apply specific ones, he has frequently, as his MSS. show, altered his own, because he found previous terms, that would answer for specific and generic names, had been used by Gronovius, Scheuchzer, and others. Linnæus appears to have paid great attention to the Gramineæ. The specimens are in remarkably good condition, and in only two instances are they insufficient for absolute identification.

The numbers in the Herbarium refer to those used in the first edition of the 'Species Plantarum,' Linnæus's own copy being very carefully marked by himself. In the following list I have used these numbers, *underlining* them, as was done by Linnæus himself, thus 1, 2, &c., to imply that the plant was actually in the Herbarium. When Linnæus's name remains unaltered in the best authors of the present day, I have marked the plant with ! after the name, as, 1. *Lygeum Spartum*, L.! I have carefully examined every grass in the Herbarium; and in annexing the following list of names which I consider they should bear, I trust the list may be of some little use to botanists who are unable to consult the Herbarium itself. I have inserted all the names contained in the following works by Linnæus:—first, all in the 1st edition of the 'Species Plantarum,' published 1753; then all extra in the 2nd edition, published in 1762; then all in the two Parts of the 'Mantissa' (as far as p. 143 published in 1767, and from that to the end in 1771), which Linnæus styles a supplement to the 6th edition of the 'Genera Plantarum' and to the 2nd edition of the 'Species Plantarum.' I have also included all published in a paper entitled "A First and Second Century of Plants collected in various parts of the world, by Kalm, Osbeck, Loefling and others," in the 4th volume of the 'Amœnitates Academicæ' (1759), and, further, all grasses contained in a paper on the plants of Jamaica sent by Browne, in the 5th volume of 'Am. Acad.' (1760). These, with the exception of about half-a-dozen described in the 'Systema Naturæ,' also included in this list, appear to me to comprise all the grasses for the nomenclature of which Linnæus is personally responsible.

I have also occasionally added a few notes on some of the grasses of the younger Linnæus, which are in the Herbarium.

Stoke Bishop, near Bristol,
February 18th, 1861.

Cinna, *Sp. Pl.* 1st edit. p. 5.

1. *Cinna arundinacea,* L.! The specimen is from the Upsal Garden, raised from seeds sent by Kalm from North America, where the plant is common. In the same envelope, without number or locality, is a specimen of *Hymenachne Myurus,* P. de B.

Anthoxanthum, *l. c.* p. 28.

1. *A. adnatum,* L. The well-known vernal grass. The only species, in the Herbarium, of the genus.
2. *A. Indicum* is stated to be No. 25 Fl. Zeyl., which is in Hermann's Herb. vol. v. fol. 29, and is *Perotis latifolia,* Ait., very fairly figured by Plukenet, t. 119. f. 1.
3. *A. paniculatum,* described by Linn. as having 4-flowered spikes. I am unable to decide positively what this is; but Kunth is probably correct when he states it is a synonym of *Festuca spadicea,* Gouan.

Nardus, *l. c.* p. 53.

1. *N. stricta,* L.!
2. *N. Gangitis* is *Lepturus incurvatus,* Trin. The specimen collected at Montpellier. Much confusion has been occasioned by the drawings erroneously quoted by Linnæus. Lobel, Icon. 84 is one of leaves only, and is, I believe, *Andropogon laniger,* Desf.; Morison, t. 13. f. 8 is *Ctenium Americanum*; hence Kunth quotes *N. Gangitis,* Linn., as a synonym of that plant. Why the name *Gangitis* was given to a plant collected in the South of France, it is difficult to explain, except from some confusion regarding Lobel's plant, which is one of those believed to produce the Nard of the ancients. The specimen is to be found amongst *Festuca,* q. v.
3. *N. ciliaris* is *Ischæmum leersioides,* Munro in Seemann's Herb.
4. *N. articulatus.* There is no specimen of this; and it is omitted in the 2nd edition.

N. aristatus, 2nd edit. p. 78, from Rome, is *Psilurus nardoides,* Trin.

N. Indica, Linn. Herb., is *Microchloa setacea,* R. Br.

N. Thomæ, Linn. Herb., is *Oropetium Thomæum,* Trin.

LYGEUM, *Sp. Pl.* 2nd edit. p. 78.

1. *L. spartum*, L.!

CORNUCOPIÆ, *Sp. Pl.* 1st edit. p. 54.

1. *C. cucullatum*, L.!

C. alopecuroides, Mant. p. 28 (1767), is *Alopecurus utriculatus*, Pers.

SACCHARUM, *l. c.* p. 54.

1. *Saccharum officinarum*. The specimen marked by Linnæus himself is not the true Sugar-cane, but is *Erianthus Japonicus*, P. de B. It is also wrongly marked in pencil, "*Sacch. polystachyum*, Sw.?" which is *Panicum ferrugineum*, Kunth. The reference to Sloane, Jam. p. 108, t. 66, is correct, that being a very fair drawing of the true Sugar-cane.

2. *S. spicatum* is *Imperata arundinacea*, Cyrill. One specimen is from C. B. S., and another has been named by Smith *Perotis latifolia, β*, Willd., i. 324, where, however, the confusion is very great, two or three different plants being confounded together.

S. spontaneum, L.! Mant. p. 183, from Koenig.

S. Ravennæ, Linn. Herb., is *Erianthus Ravennæ*.

PHALARIS, *l. c.* p. 54.

1. *P. Canariensis*, L.!

2. *P. phleoides* is *Phleum Boehmeri*, Wib.

3. *P. arundinacea*, L.!

4. *P. erucæformis* is *Beckmannia erucæformis*, Host.

5. *P. oryzoides*. One, from Gronovius, is *Leersia oryzoides*, Sw.; another specimen, from Browne, is *Leersia hexandra*, Sw.

The following also in Herbarium:—

P. bulbosa, Amœn. Acad. iv. 264; 2nd edit. Sp. Pl. p. 79, is *Phleum tenue*, Schrad.

P. aquatica! Am. Ac. *l. c.*

P. zizanioides, Mant. 183, is *Andropogon muricatus*, Retz.

P. tuberosa, Mant. 557, is marked by Smith as *P. nodosa*, Syst. Veg., and is the plant now so called.

P. paradoxa, Linn. Herb., from Upsal Garden, is the plant so called now. In MS. notes to 1st edit. it is called by Linn. *P. utriculosa*, with a marginal note "*P. paradoxa*, 1665."

PASPALUM

is not a genus of the 1st edit., but appears in the 2nd, p. 81; and the following species are in the Herbarium:—

P. dissectum, L.! From North America, *Kalm*. This was published in 1st edit. Sp. Pl. p. 57, as *Panicum dissectum*. Pinned to this is a specimen of *Paspalum conjugatum*, Berg.

P. virgatum, L.! From Browne, well figured by Sloane, t. 69. fig. 2.

P. paniculatum, L.! Another specimen, pinned to this, and also marked *paniculatum*, is *Paspalum fluitans*, Kunth.

P. distichum! Amœn. Acad. v. 391, from Jamaica, *Browne*.

P. scrobiculatam, L.! Mant. 29. Raised in the Upsal Garden, from seeds received from India.

A plant marked by Linn. "*Paspalum*," and by Smith "*pubescens*, Br. Prod. i. 188?" is *Paspalum granulare*, Trin.

In the same envelope, merely marked C. B. S., is a specimen of *Eustachys petræa*, Desv.

PANICUM, *Sp. Pl.* 1st edit. p. 55.

1. *P. alopecuroideum* is *Gymnothrix Thouarii*, P. de B. Received by Linnæus from China. The reference to Plukenet, t. 119. f. 1, is incorrect, as that is *Perotis latifolia*, Ait. The reference in 2nd edit. f. 82, to Pluk. t. 92. f. 5, is probably correct.

2. *P. polystachyum*. The specimen is *Pennisetum barbatum*, Schult. Another, from the Upsal Garden, is *Setaria glauca*, P. de B., stated to have been raised from American seeds. Another is *Setaria viridis*, P. de B., and another, also marked 2, and pinned to the others, is *S. verticillata*, P. de B.

3. *P. Americanum*. There is no specimen in Herb.; and the plant is omitted in the 2nd edition.

4. *P. Italicum* is *Setaria Italica*, Kunth. Another specimen, from Upsal Garden, is named *P. Germanicum* by Linnæus.

5. *P. Crus Galli*, L.! A small state, from Kalm.

6. *P. dissectum*. Already referred to as *Paspalum dissectum*.

7. *P. dimidiatum* is *Stenotaphrum Americanum*, Schrank. The specimen from India.

8. P. (*Digitaria*) *sanguinale*! L.

9. *P. filiforme*, from Kalm, is *Paspalum filiforme*, Sw. This contains also a piece of *Muhlenbergia diffusa*, Willd. Another sheet, from Upsal Garden, contains *P. sanguinale*, L.

10. *P. compositum*. The plant was originally described from Fl. Zeyl. 42, and is what is now called *Oplismenus compositus*; but the specimen in the Herbarium is *Oplismenus Burmanni*.

11. *P. dichotomum*, L.! From Kalm, and is the plant described by A. Gray as *dichotomum*.

12. *P. clandestinum*, L.! From Kalm also, a form of *P. latifolium*, L. Linnæus's reference to Sloane, t. 80, is erroneous, as that is a species of *Manisuris*.

13. *P. capillare*, L.! From the Upsal Garden.

14. *P. patens*, L.!

15. *P. dactylon* is *Cynodon dactylon*, Pers.

16. *P. miliaceum*, L.!

17. *P. latifolium*, L.! From Kalm, North America. A specimen attached to this from Carolina is *P. divaricatum*, L., to which Sloane's figure, t. 71. f. 3, belongs; another, marked *latifolium*, is *P. oryzoides*, Sw.

18. *P. brevifolium*, L.! Allied to *P. patens*. The specimen was from India; but the reference to Plukenet, t. 189, f. 4, is erroneous, that being *Isachne australis*.

19. *P. arborescens* is *P. notatum*, Retz. Obs. iv. 18, and is very different from the *arborescens* of Fl. Zeyl. 43, of which there is a specimen in Hermann's Herb., and is probably *P. patens*. On the same sheet in Linnæus's Herb. are some portions of a species of *Arundinaria*, which may have been the origin of *arborescens*.

20. *P. virgatum*, L.! From Gronovius.

P. verticillatum, 2nd edit. p. 82, is *Setaria verticillata*: vide No. 2, ante.

P. glaucum, *l. c.* 83, is *S. glauca*, P. de B.

P. viride, *l. c.* 83, is *S. viridis*, P. de B.

P. hirtellum, Am. Acad. v. 391, from Jamaica, is *Oplismenus Burmanni*, P. de B.

P. Crus Corvi, L.! 2nd edit. p. 84. From a garden.

P. colonum, L.! 2nd edit. p. 84, also marked *P. brizoides*. One from Browne is true *colonum*; another, marked *colonum*, is *Echinochloa Crus Galli*.

P. lineare, *l. c.* p. 85.

P. grossarium, L.! Am. Acad. v. 392. This plant is often called *P. pubescens*.

P. divaricatum, L.! Am. Acad. v. 392. From Jamaica. This plant has often been confounded with *P. latifolium*, and bears the names of *P. ruscifolium*, *maculatum*, *glutinosum*, and *agglutinans*. Another specimen of *divaricatum* is marked *arborescens* by Smith.

P. repens, L.! 2nd edit. Sp. Pl. p. 87. This is *P. arenarium*, Brotero.

P. brizoides, Mant. 184, is *P. colonum*. See above.

P. conglomeratum, Mant. 324, is, I suppose, the same as *P. Indicum*; there is, however, no specimen so marked.

P. distachyon, L.! Mant. 183. Closely allied to *P. Petiverii*, Trin., with only two spikes.

P. ramosum, L.! Mant. 29, from the Upsal Garden. A common species in India, closely allied to *P. grossarium*.

P. coloratum, L.! Mant. 30, from Upsal Garden. This approaches *P. virgatum* very closely, and is unlike any uncultivated plant I have seen. Smith quotes Jacquin, Icon. Rar. i. t. 12.

P. curvatum, L.! Syst. Nat. xii. 732, is a loosely flowered state of what is usually called *P. interruptum*, Willd. The specimen is marked by Smith as "*Holcus striatus*."

P. Indicum, L.! Herb. Linn., Mant. 184, from Koenig. This is also marked *Panicum Johannæ*. A very small simple state.

P. incurvum, Linn. Herb., is a hairy-glumed state of the preceding, also marked by Smith as *Holcus striatus*.

P. musciparum, Linn. Herb., which I cannot find described anywhere, is *P. miliare*, Lam.

P. oryzoides, Herb. Linn., marked "Ard. Spec. 2, t. 5," is *Echinochloa stagnina*, P. de B.

No. 516, placed in *Panicum*, is *Sporobolus Indicus*, R. Br.; and

No. 513, also so placed, is *Eragrostis brizoides*, N. ab E.

PHLEUM, *Sp. Pl.* 1st edit. p. 59.

1. *P. pratense*, L.!
2. *P. alpinum*, L.!
3. *P. arenarium*, L.!
4. *P. schœnoides* is *Crypsis schœnoides*, Lam.

P. nodosum, Sp. Pl. 2nd edit. p. 88, is only a form of *P. pratense*.

ALOPECURUS, *l. c.* p. 60.

1. *A. pratensis*, L.!
2. *A. geniculatus*, L.!
3. *A. hordeiformis* is *Gymnothrix cenchroides*, R. et Sch.
4. *A. Monspeliensis* is *Polypogon Monspeliensis*, Desf.

A. agrestis, L.! 2nd edit. p. 89.

A. paniceus, 2nd edit. p. 90, is called *Cynosurus paniceus* in 1st edit., and is *Polypogon maritimus*, Willd.

Alopecuroides, so marked in Linn. Herb., is *Gymnothrix Thouarii,* P. de B.; and another so called is *Penicillaria spicata,* Willd., marked by Smith as "*Alopecurus indicus,* Syst.Veg., sent by Afzelius as *Holcus spicatus mas.*"

MILIUM, *Sp. Pl.* 1st edit. p. 61.

1. *M. effusum,* L.!

2. *M. confertum* is *Piptatherum.*

M. paradoxum, 2nd edit. p. 90, called *Agrostis paradoxa* in 1st edit., is *Piptatherum paradoxum,* P. de B.; and one pinned to it, from Carniola, is *Piptatherum virescens* of Trin.

M. lendigerum, 2nd edit. p. 91, is *Gastridium australe,* P. de B.

M. punctatum, Am. Acad. v. 392, from Jamaica, Browne, is *Helopus pilosus,* Trin.

M. capense, Mant. 185, is *Danthonia* (*Pentaschistis*) *papillosa,* N. ab E., or an allied species.

AGROSTIS, *l. c.* p. 61.

1. *A. Spica Venti* is *Apera Spica Venti,* P. de B.

2. *A. miliacea,* from Upsal Garden, is *Piptatherum multiflorum,* P. de B., as also is another, marked *A. sepium.*

3. *A. arundinacea* is *Deyeuxia sylvatica.*

4. *A. rubra.* Not in Herb.

5. *A. canina,* L.! Smith has marked one specimen of this "*capillaris,* Huds. nec Linn.; *Agrostis vulgaris,* Fl. Brit.; *tenuis,* Sibth."

6. *A. paradoxa* is *Milium paradoxum,* referred to above.

7. *A. stolonifera.* The Herbarium contains one of the forms of *A. vulgaris,* which is called *stolonifera,* the Fiorin Grass; another, marked *stolonifera* by Linn., is *A. verticillata,* Vill.

8. *A. capillaris,* L.!

9. *A. alba,* L.! An unawned state; and pinned to it is a specimen of *A. canina.*

10. *A. minima* is *Mibora verna,* Adans.

11. *A. Virginica* is *Vilfa Virginica,* P. de B.; and pinned to it is a specimen from Kalm of *Sporobolus heterolepis,* A. Gray.

12. *A. Indica,* from Browne, is *Sporobolus Indicus,* R. Br.; and pinned to it is a specimen of *Polypogon Monspeliensis,* Desf., also marked by Linn. "*Indica* 12." The reference to Pluk. t. 191. f. 5, is erroneous, as that is *Heteropogon contortus.*

A. Calamagrostis, Sp. Pl. 2nd edit. p. 92. Not in Herb.

A. interrupta, Sp. Pl. 2nd ed. p. 92. Not in Herb.

A. radiata, Am. Acad. v. 392, from Browne, is *Chloris radiata,* Sw.

A. cruciata, Sp. Pl. 2nd ed. p. 94, from Browne, is *Chloris cruciata,* Sw.

A. bromoides, Mant. 30, is *Aristella bromoides,* Bertol.

A. australis, Mant. 30, is *Gastridium australe,* P. de B.

A. serotina, l. c. 30, is *Diplachne serotina,* Link.

A. Matrella, l. c. 185, is *Zoysia pungens,* Willd.

A. pumila, L.! *l. c.* 31, I think a good species, although included by Kunth and others in *A. vulgaris.* It is about 3 inches high.

A. Mexicana, l. c. 31, from Upsal Garden, is *Muhlenbergia Mexicana,* Trin.

A. Cornucopiæ, Linn. Herb., from Kalm, is the plant properly so called now, and which has been subdivided into *A. laxiflora, A. scabra, A. Michauxii,* &c. The naming is not in Linnæus's handwriting.

A. tenacissima, Linn. Herb., is *Muhlenbergia sobolifera,* Trin.

A. maritima, Linn. Herb., from Klein, is *Vilfa pungens,* P. de B., also *Phalaris disticha,* Forsk.

A. aurea, Hall, 1498, is *Agrostis setacea,* Curtis.

A. No. 20 is *Hymenachne Myurus,* P. de B.

A. without a specific name is *Leptochloa virgata,* P. de B.

The same envelope contains a species of *Chusquea* from Browne, a specimen of *Poa nemoralis,* of *Deyeuxia neglecta,* and *Festuca sylvatica,* none named.

AIRA, *Sp. Pl.* 1st edit. p. 63.

1. *A. spicata.* In the 2nd edition this name is altered to *A. Indica.* It is *Panicum Indicum,* L. The specimen is marked by Linn. "*Panicum,*" and a reference is made to Mant. 184, where the plant is described as *Panicum Indicum. A. spicata* of 2nd edition, p. 95, is *Trisetum subspicatum,* P. de B.

2. *A. cristata.* Not in Herb. Probably *Kœleria aristata.* See No. 12, below.

3. *A. cærulea* is *Molinia cærulea,* Mœnch.

4. *A. arundinacea.* Not in Herb.

5. *A. minuta.* A small state of *Airopsis agrostidea,* Cand.

6. *A. aquatica* is *Catabrosa aquatica,* P. de B.

7. *A. subspicatum* is *Trisetum subspicatum,* P. de B.

8. *A. cæspitosa* is *Deschampsia cæspitosa,* P. de B. A viviparous speci-

men from Lapland is marked by Smith as "*lævigata* fide Don;" a species of *Poa nemoralis* is pinned to it.

9. *A. flexuosa* is *Deschampsia flexuosa.*

10. *A. montana.* Part is *Agrostis rupestris,* All.; part is *Poa flexuosa,* Wahl.; and another, marked "from China, Osbeck," is *Eriachne Hookeri,* Munro in Hb. Hooker., from Assam and Tenasserim.

11. *A. alpina* is *Deschampsia alpina.*

12. *A. canescens* is *Corynephorus canescens,* P. de B.; and pinned to it are two specimens of *Kœleria cristata,* which probably belong to No. 2.

13. *A. præcox,* L.!

14. *A. caryophyllea,* L.! Pinned to it is a specimen of *Poa annua.*

A. capensis, Linn. Herb., is *Ehrharta calycina,* Sm. The same envelope contains a specimen of *Sporobolus Indicus,* and a *Brizopyrum* from C. B. S.

MELICA, *Sp. Pl.* 1st edit. p. 66.

1. *M. ciliata,* L.!

2. *M. nutans,* L.!

3. *M. altissima,* L.!

M. papilionacea, L.! Mant. 31. From Brazil, *Arduin.* Linnæus also called this, in MS., *M. spectabilis.*

M. minuta, L.! Mant. 32.

M. Falx, Linn. fil. Supp. 109, is *Harpechloa capensis,* Kunth.

M. cynosuroides, Linn. Herb., is *Enteropogon melicoides,* Nees.

POA, *l. c.* p. 67.

1. *P. aquatica* is *Glyceria aquatica,* Sm.

2. *P. alpina,* L.! Two specimens, one of which is from Lapland, are true *P. alpina*; and there are two of *P. trivialis.* Linn. in MSS. says *alpina* may be a form of *trivialis.*

β. vivipara. Of this there are three sheets, all *P. alpina,* except part of one, which is *Festuca ovina* viviparous.

3. *P. trivialis,* L.!

4. *P. angustifolia.* One specimen is *P. pratensis,* var. *angustifolia*; and another, pinned to it, is *P. nemoralis*; another is *P. annua.*

5. *P. pratensis,* so marked by Linn. fil., is *P. alpina.*

6. *P. annua,* L.!

7. *P. flava,* marked Gron. Virg. 13, is *Poa crocata,* Michx.; but that name should be altered to *P. flava.*

8. *P. pilosa.* Not in Herb.

9. *P. amabilis,* L.! This is the plant which is generally called *P.* (*Eragrostis*) *plumosa,* Link. It is also Hermann's species (fide Herb. ii. 59!) from which *Fl. Zeyl.* 46 is described, and is Pluk. t. 300. f. 2, marked in the margin, by Linnæus himself, *P. amabilis,* and to be found in Plukenet's Herb. i. 187, from Cape Comorin. The plant generally called *P. amabilis* is *P.* (*Erag.*) *unioloides,* and is also to be found in Plukenet's Herb. *l. c.*

10. *P. Eragrostis,* L.!

11. *P. capillaris,* L.! One from Kalm; another from Sloane, figured at t. 72; and another from Upsal Garden: all true *P.* (*Erag.*) *capillaris.*

12. *P. Malabarica* is *Panicum Arnottianum,* Nees. The reference to Rheede is correct; it is a very fair drawing.

13. *P. Chinensis,* sent by Osbeck from China, is *Leptochloa Chinensis,* Nees.

14. *P. tenella.* There is much confusion about this plant. There is no specimen in the Herb. of what is now considered *tenella.* One from India marked *tenella* by Linn. is the same as No. 9, above, *P. amabilis*; and Linnæus has written a long MS. description on the specimen. Rumph. Amb. 6, t. 4. f. 3, is a good drawing, and is marked by Linnæus himself as *Poa tenella.* Rheede, if correctly quoted, is a miserable drawing. Pluk. t. 300. f. 2 is *P. amabilis.* I therefore consider that all above belong to *P. amabilis,* and that the *P. tenella* ultimately intended by Linnæus is what is now called *Eragrostis tenuissima,* Schrad., is Pluk. t. 190. f. 4, and is in his Herb. i. 186!

15. *P. compressa,* from Upsal Garden, is ordinary *Poa pratensis.*

16. *P. nemoralis,* L.! Seven sheets are correct; one, also so marked, from Kalm, is *Reboulea gracilis,* Kunth; *Reboulea truncata,* Torr.

17. *P. bulbosa,* L.! All viviparous except one specimen with very narrow leaves and extremely similar to *P. ligulata,* Boiss.

P. palustris, 2nd edit. Sp. Pl. p. 98. Not in Herb.

P. rigida, Am. Acad. iv. 265, is *Festuca rigida,* Kunth.

P. ciliaris, L.! Am. Acad. v. 392. From Jamaica, *Browne.*

P. spicata, Mant. 32. Not in Herb.

P. distans, Mant. 32, is *Sclerochloa arenaria,* Nees. This is marked by Linnæus "*Aira aquatica.*"

A plant marked *Poa* by Linn., and *Aira cristata*, No. 14, by some other person, is *Kœleria cristata*, Pers.

" *Poa juncea*, &c., Hall. Hist. 1459," is *Festuca spadicea*, Gouan. The same envelope also contains a specimen of *Poa arctica* and *Eragrostis bifaria*, Vahl, both unnamed.

BRIZA, *Sp. Pl.* 1st edit. p. 70.

1. *B. minor*, L.!
2. *B. media*, L.!
3. *B. maxima*, L.!
4. *B. Eragrostis*. One specimen from Kalm, and one marked " Morison, Hist. 204, t. 6. f. 52," are both *Poa Eragrostis*, L.! One marked C. B. S. 384, is *Eragrostis Chapellieri*, Kunth.

B. virens, 2nd edit. p. 103, is merely a form of *B. media*. One specimen is marked by Linnæus " *B. anceps*."

UNIOLA, *l. c.* p. 71.

1. *U. paniculata*, L.! Pluk. t. 32. f. 6 is a good drawing.
2. *U. spicata*, L.! One from Kalm is *Poa Michauxii*, Kunth; another, from Siberia, Pallas, is *Æluropus brevifolius*, Trin.

U. bipinnata, 2nd edit. p. 104, is *Poa* (*Eragrostis*) *cynosuroides*, Retz.

U. mucronata, *l. c.*, is not in the Herbarium.

DACTYLIS, *l. c.* p. 71.

1. *D. cynosuroides* is *Spartina cynosuroides*, Willd.
2. *D. glomerata*, L.!

D. ciliaris, Mant. 185, from C. B. S., is *Lasiochloa ciliaris*, Kunth.

D. lagopoides, Mant. 33, is *Æluropus lævis*, Trin.

Another, marked, but not by Linn., " *Dactylis paleacea*, 296," is *Kœleria cristata*, Pers.

CYNOSURUS, *l. c.* p. 72.

1. *C. cristatus*, L.!
2. *C. echinatus*, L.!
3. *C. Lima* is *Wangenheimia disticha*, Mœnch.
4. *C. durus* is *Sclerochloa dura*, P. de B.
5. *C. cœruleus*. One specimen is *Sesleria cœrulea*, Arduin; the other is *S. sphærocephala*, Arduin.

6. *C. Ægyptiacus* is *Dactyloctenium Ægyptiacum,* Willd. There are one erect and one procumbent form of the same from Jamaica (Browne).

7. *C. Indicus* is *Eleusine Indica,* Gærtn. One specimen, sent from Browne.

8. *C. paniceus* is *Polypogon Monspeliensis,* Desf., omitted in 2nd edition.

9. *C. aureus* is *Lamarckia aurea,* Mœnch.

C. virgatus, Am. Acad. v. 393, from Jamaica (Browne), is *Leptochloa virgata,* P. de B.

C. Coracanus, Sp. Pl. 2nd ed. p. 106, is *Eleusine Coracana,* Gærtn.

C. Uniolæ, Linn. fil. Supp., is *Brizopyrum unioloides,* Nees; and this contains a small scrap of *Cynodon Dactylon,* Pers.

FESTUCA, *Sp. Pl.* 1st edit. p. 73.

1. *F. ovina,* L.! Correct, except one from Kalm, which is *F. tenella,* Willd. Another in the Herbarium, marked *F. varia,* Hall. 1439, is also *ovina.*

2. *F. duriuscula,* L.!

3. *F. rubra,* L. has very hairy spiculæ. Linn. in a MS. note says it is a variety of *duriuscula.* One pinned to it is marked by Linn. *F. dumetorum,* and is certainly only *rubra.*

4. *F. amethystina.* Not in Herb.

5. *F. Myurus,* L.! A very small dwarf state.

6. *F. maritima.* Not in Herb.

7. *F. bromoides,* L.! In my opinion, the same as No. 5.

8. *F. decumbens* is *Triodia decumbens,* P. de B.

9. *F. elatior,* L.! Another sheet of this is marked "*F. palustris,* No. 26."

10. *F. fluitans* is *Glyceria fluitans,* Br.

11. *F. cristata,* also marked by Linn. "*Poa cristata,*" is *Kœleria phleoides,* Pers., also marked by Linn., on the back of the sheet, "*Alopecurus Monspeliensis.*"

F. reptatrix, 2nd edit. Sp. Pl. p. 108, from Egypt, is *Diplachne fusca,* P. de B.

F. fusca, l. c. 109, is the same plant.

F. calycina, l. c. 110, is *Schismus marginatus,* P. de B. This is also marked "12. *F. barbata.*"

F. decumbens, l. c. 110. Not in Herb.

F. serotina, l. c. 111. Not in Herb.

F. dumetorum, l. c. 109. Already mentioned under No. 3.

F. spadicea, L.! Syst. Nat. 732.

F. phœnicoides, Mant. 32. Not in Herb.

There is also a specimen of *F.* [*Vulpia*) *ciliata* not marked by Linn.; also one of *Sclerochloa arenaria*; another, marked "*F.* Hall. Hist. 1445," is *Kœleria cristata*; another, unnamed, is *Festuca borealis,* Mert. & Koch.

F. spinosa, Linn. fil. Supp. 111, is *Eragrostis spinosa,* Pers.

In this envelope, but why placed here I know not, is part of a plant marked "*Nardus spuria Gangitis,* Lobel." It is the lower portion of the culm of *Andropogon laniger,* Desf., known in commerce as *Schœnanthus,* &c.

BROMUS, *Sp. Pl.* 1st edit. p. 76.

1. *B. secalinus,* L.! Pinned to it a specimen of *B. mollis,* marked "*B. hordeaceus,* No. 32."
2. *B. squarrosus,* L.!
3. *B. purgans,* from Upsal Garden, is the same as No. 4.
4. *B. ciliatus,* L.! From Kalm, and his seeds raised in Upsal Garden. One marked *B. ciliatus* by Smith is *B. rubens.*
5. *B. sterilis,* L.!
6. *B. arvensis,* L.! marked by Smith "Cav. Ic. 590."
7. *B. tectorum,* L.!
8. *B. hordeaceus.* Omitted in 2nd edition, and referred to *B. mollis,* which it is.
9. *B. giganteus,* from Arduin, is *Festuca gigantea,* Vill.
10. *B. pinnatus* is *Brachypodium pinnatum,* P. de B.
11. *B. cristatus* is *Triticum cristatum,* Schreb. In the MS. notes of 2nd edition it is transferred to *Triticum.*

B. mollis, L.! 2nd edit. p. 112. One small specimen is marked "*B. nanus,* Weigel."

B. Madritensis, L.! Am. Acad. iv. 265. From Upsal Garden; another specimen, marked "No. 35 *Bromus erectus,* R. Syn.," is also this.

B. rubens, L.! Am. Acad. iv. 265. From Spain.

B. scoparius, L.! Am. Acad. *l. c.* The true plant from Spain; another marked *scoparius* is *B. Japonicus.*

B. racemosus, L.! 2nd edit. Sp. Pl. p. 114. Linnæus has marked one specimen *B. secalinus.*

B. triflorus, l. c. p. 115. Not in Herb.

B. distachyos, Am. Acad. iv. 304, is *Trachynia distachya*, Link. One specimen is marked by Linn. as his *Secale bromoides*; and another, pinned to it, No. 36, from England, is *Brachypodium sylvaticum.*

B. inermis! Mant. 186, is in Herb.; but no specimen is so marked by Linnæus.

B. ramosus. There is much confusion, again, about this plant. The plant described in Mant. 34, sent from the East, and marked "Allioni, 2233, from Scheuchzer," is *Brachypodium ramosum*, R. et Schultes, the term *ramosus* being applicable to the stem. The only plant marked *ramosus* by Linn. is *Bromus asper* of Murray, sent by Schreber.

B. geniculatus, Mant. 33, is *Festuca* (*Vulpia*) *geniculata*, Willd.

B. rigens, Mant. 33, is a hairy-glumed state of *B. scoparius*, L.

B. stipoides, Mant. 557, is *F.* (*Vulpia*) *geniculata*, Willd.

There is also a specimen of *B. erectus*, Huds., marked "*B. agrestis*, Allioni." A specimen of *Brachypodium sylvaticum* is marked "*Bromus gracilis*, Weigel."

STIPA, *Sp. Pl.* 1st edit. p. 78.

1. *S. pennata*, L.!

2. *S. juncea*, L.! One is correct, and one specimen is *S. sparta*, Trin., with much smaller flowers.

3. *S. avenacea*, L.! "Virg. Gron. 133." This is also marked "No. 3. *capillata.*"

S. capillata, L.! 2nd edit. p. 116. There is a specimen not named.

S. tenacissima, Am. Acad. iv. 266, is *Macrochloa tenacissima*, Kunth.

S. membranacea, 2nd edit. p. 116, is *Festuca* (*Vulpia*) *uniglumis*, Solander.

S. arguens, l. c. p. 117, is *Anthistiria ciliata*, Linn. fil.

S. Aristella, Syst. Nat. iii. 229, is *Aristella bromoides*, Bertol.

S. Spinifex, Mant. 34, is *Spinifex squarrosus*, Linn. fil.

S. spicata, Thunb. 378, is *Heteropogon hirtus*, Pers.

There is also a specimen of *Lasiagrostis Calamagrostis*, Link, without a name.

AVENA, *l. c.* p. 79.

1. *A. Sibirica*, from Gmelin, is *Stipa Sibirica*, Lam.

2. *A. elatior* is *Arrhenatherum avenaceum*, P. de B.

3. *A. Pennsylvanica*, from Kalm, is *Trisetum palustre* of Trinius and American authors.

4. *A. Lœflingiana*, from Spain, is *Trisetum Lœflingianum*, P. de B.

5. *A. sativa*, L.! One specimen is marked by Linn. *A. ponderosa.*

6. *A. fatua*, L.! One sheet marked 6 is *A. barbata*, Brot.

7. *A. flavescens* is *Trisetum flavescens*, P. de B. Pinned to it a specimen of *A. pratensis.*

8. *A. fragilis* is *Gaudinia fragilis*, P. de B.

9. *A. pratensis*, L.! Some specimens are also marked "*spicata*," which they are not.

10. *A. spicata*, from Kalm, is *Danthonia spicata*, N. et Sch., also marked "*bromoides.*"

A. nuda, Am. Acad. iii. 401, is an unnamed state of *A. sativa.*

A. sterilis, L.! 2nd edit. Sp. Pl. p. 118, is probably only a form of *A. fatua.* One pinned to it, also marked *A. sterilis*, is *Macrochloa arenaria*, Kunth.

A. sesquitertia, Mant. 33. No specimen in Herb.

A. pubescens, L.! 2nd edit. Sp.Pl. 1665, is only a form of *A. pratensis*, as Linnæus in a MS. note suggests: he has also marked it "*Avena* near *sesquitertia.*"

A. stipiformis, Mant. 34. Not in Herb.

A. patula, Hall. Hist. 1489, from Dick, is a small state of *A. pratensis.*

A. bromoides, Sp. Pl. 1666, is *A. pratensis*, L.

A. hispida, Thunb., is *Tristachya leucothrix*, N. ab E.

There are four species of *Danthonia* from C. B. S. without names, but probably sent by Thunberg. The same envelope contains a specimen of *Andropogon Schœnanthus*, a scrap of *Diectomis fastigiata*, and of *Bromus squarrosus.*

LAGURUS, *Sp. Pl.* 1st edit. p. 81.

1. *L. ovatus*, L.!

L. cylindricus, 2nd ed. p. 120, is the large European form of *Imperata arundinacea*, Cyrill.

ARUNDO, *l. c.* p. 81.

1. *A. Bambos* is *Bambusa arundinacea*, Willd. The leaves attached are small, and the stipules spinous.

2. *A. Donax*, L.! Both specimens are marked "Kl.," which, I suppose, indicates Klein. One is real *A. Donax*; the other is *Phragmites communis*, Trin.

3. *A. Phragmites*, from Browne and from Ind. or., are *Phragmites communis*, Trin. A much expanded state is marked "*Phrag. arundinacea*, Allam. Ep. ad Linn. 1770."

4. *A. epigejos*. The first marked by Linn. "*epigejos*" is *Phragmites*. Pinned to it are specimens of *Deyeuxia montana*, Poir., one marked on the back "*A. montana*, Fl. Suec.;" and one is *Calamagrostis lanceolata*, Roth.

5. *A. Calamagrostis* is *Calamagrostis epigejos*, Roth. Awn basal, with hairs longer than the flower. Another marked "*A. Calamagrostis*" is *Lasiagrostis Calamagrostis*, Link.

6. *A. arenaria* is *Ammophila arundinacea*, Host.

ARISTIDA, *Sp. Pl.* 1st ed. p. 82.

1. *A. Adscensionis*, L.! Linn. remarks that this is one out of four plants which constitute the flora of the Island of Ascension, the others being *Sherardia fruticosa*, *Euphorbia origanoides*, and *Portulaca*.

A. Americana, L.! Am. Acad. v. 393. From Jamaica, Browne. This is called *A. dispersa* by Trin.; but Linnæus's name ought to take precedence. Kunth has misplaced the Linnean synonym in *Eutriana juncifolia*.

A. plumosa, L.! 2nd edit. Sp. Pl. p. 1666, from Armenia, is *Aris.* (*Stipagrostis*) *plumosa*.

A. arundinacea, Mant. p. 186, from Koenig, is *Arundo Madagascariensis*, Kunth.

There is a specimen of *Aristida Hystrix*, from Thunb., and another, marked No. 47, var. β, is *A. vestita*, Thunb.

LOLIUM, *Sp. Pl.* 1st ed. p. 83.

1. *L. perenne*, L.!

2. *L. temulentum*, L.!

L. tenue, 2nd ed. Sp. Pl. 122, is merely a form of *L. perenne*.

L. distachyon, Mant. p. 186, from Koenig, is *Digitaria ciliaris*, Pers.

ELYMUS, *Sp. Pl.* 1st ed. p. 83.

Linnæus has not attached his usual mark to the five following as being in his Herbarium; but they are all present:—

1. *E. arenarius*, L.!

2. *E. Sibiricus*, L.!

3. *E. Canadensis*, L.!

4. *E. Virginicus*, L.!

5. *E. Caput Medusæ*, L.!

E. Philadelphicus, Am. Acad. iv. 266, from Canada, is the same as No 3 (*E. Canadensis*).

E. Hystrix, L.! Sp. Pl. 2nd ed. p. 124. From Gronovius.

E. caninus, Fl. Suec., 2nd ed. Sp. Pl. p. 124. Two specimens marked "B and 37," from England, are *Triticum caninum*, Schrad. One marked "*Gmelin* 23" is *Trit. repens*; another marked "*Gm.* 25" is *Elymus Sibiricus*.

E. Europæus, L.! Mant. 35.

SECALE, *Sp. Pl.* 1st ed. p. 84.

1. *S. cereale*, L.!

2. *S. villosum*. Not in Herb.

3. *S. orientale*. Not in Herb.

4. *S. creticum*. One was originally so marked by Linn., but was scratched through. It is *Triticum villosum*, P. de B.

HORDEUM, *Sp. Pl.* 1st ed. p. 84.

1. *H. vulgare*, L.!

2. *H. hexastichon*. Not in Herb.

3. *H. distichon*. Not in Herb.

4. *H. Zeocriton*, L.! Awn of the central spicula 4–5 inches.

5. *H. murinum*, L.! Intermediate glumes sometimes fringed.

6. *H. jubatum*, L.! From Kalm.

H. bulbosum, Am. Acad. iv. 304. Has a very remarkable bulbous stem; but I believe it to be only a variety of *H. murinum*.

H. nodosum, 2nd edit. Sp. Pl. p. 126, is certainly *H. pratense*, Huds., of which there are also two other specimens without any name, and the species does not seem to have been taken up by Linnæus.

A plant marked 101 is *Secale cereale*, L.

TRITICUM, *Sp. Pl.* 1st ed. p. 85.

1. *T. æstivum*. Not in Herb.

2. *T. hybernum*. Not in Herb.

3. *T. turgidum*, L.! is ordinarily cultivated wheat, included in *T. vulgare*, Vill.

4. *T. Spelta,* L.! The specimen of this is marked 4, and is *Spelta,* but it is also marked by Linn. "*T. hybernum.*"

5. *T. monococcum,* L.!

6. *T. repens,* L.!

7. *T. caninum,* L.! A small specimen is present, but not marked. In the 2nd edition the plant is removed to *Elymus.*

T. Polonicum, L.! 2nd edition, p. 127.

T. tenellum, l.c. 127, is *Brachypodium Poa,* R. et Sch., with three nerves to the glumes.

T. junceum, L.! Am. Acad. iv. 266.

T. maritimum, 2nd edit. p. 128, is *Sclerochloa dichotoma,* Link. Another marked "*Poa maritima*" by Linn., "*T. loliacum*" by Sm., and "*Festuca maritima,* No. 69," is *Brachypodium Poa.*

T. unilaterale, Mant. 35. This is also marked "*Nardurus* 6" by Linn. and by Smith "*T. subulatum*" and "*T. Hispanicum.*" I believe them all to be forms of *T. tenellum* mentioned above.

T. prostratum, Linn. fil. Supp. 114, from Pallas, is also in the Herbarium.

ORYZA, *Sp. Pl.* 1st ed. p. 333.

1. *O. sativa,* L.!

ZEA, *Sp. Pl.* 1st ed. p. 971.

1. *Zea Mays,* L.! One male specimen and one female of the peculiar form called *Macleatum*; glumes much elongated.

COIX, *Sp. Pl.* 1st ed. p. 972.

1. *C. Lachryma Jobi,* L.!

TRIPSACUM. Not in 1st edit.; in 2nd edit., p. 1378.

T. dactyloides, L.! From the Upsal Garden.

OLYRA. Not in 1st edit.; in 2nd edit., p. 1379, from Am. Acad. v. 408.

O. latifolia, Linn.

ZIZANIA, *Sp. Pl.* 1st edit. p. 991.

1. *Z. aquatica,* L.! The plant so named is the small state which I believe Linnæus, in his Mant. p. 295, intended to indicate by *palustris,*

of which form there is also a specimen from Upsal Garden, marked "*palustris*" by Sm. *Z. aquatica* would then be Sloane's plant 110, t. 67; and the large species what is called "*Tuscanina*" in North America, of which there is a good specimen in the Herbarium marked, but not by Linn., *Z. effusa*.

2. *Z. palustris* is taken up from Rheede; but there is no specimen in the Herbarium.

SPINIFEX, *Sp. Pl.* Not in 1st or 2nd edit.: first described in Mantissa, p. 300.

S. squamosus, L.! male and female specimens.

PHARUS. Not in 1st edit.; 2nd edit., p. 1408.

P. latifolius, L.! Am. Acad. v. 409. From Jamaica.

ANDROPOGON, *Sp. Pl.* 1st edit. p. 1045.

1. *A contortum*, described from India. Not in Herb.
2. *A. divaricatum*, L.! from Virginia, Gron. 135, is *Androp. ternatus*, Nees, which name must give precedence to Linnæus's.
3. *A. nutans*, L.! From Jamaica, and also Virginia, Kalm, marked "*Lagurus*, Clayton, 600."
4. *A. alopecuroides*, from North America, is *Erianthus saccharoides*, Mich.
5. *A. distachyon* is *Apocopis Wightii*, Nees ab Esenb. Smith has written "Ask Thunberg if this be Burser's plant?" I suppose this has misled others, and hence a very different plant from Linnæus's original specimen is now called *Androp. distachyus*.
6. *A. Schœnanthus*, L.! From India and Arabia. This is the plant generally called "*A. Martini*," Roxb., "*A. pachnodes*," Trin., and many other names. It is quite distinct from Wallich's *A. Schœnanthus*. Linnæus's specimen is remarkably well figured by Ventenat, Cels. t. 89.
7. *A. Virginicum*, L.! From America.
8. *A. bicorne*, L.! From Brazil and Jamaica.
9. *A. hirtum*, L.! From Sicily, Smyrna, and Lusitania.
10. *A. Nardus*, L.! Described in Fl. Zey. 45, as *Lagurus*, and the plant there described is to be found in Hermann's Herb. vol. ii. 66.
11. *A. Ischæmum* is not the plant generally considered *A. Ischæmum*, but is *Andropogon provincialis*, Lam., a plant that I have rarely seen.

12. *A. fasciculatum.* Contains two species. One is *Eleusine Indica,* Gærtn., and the other is *Pollinia ciliata,* Trin. The reference to Sloane, t. 69, p. 2, is incorrect, as that is *Paspalum fasciculatum.*

A. caricosum, L.! 2nd edit. Sp. Pl. p. 1480, is *Androp. serratus,* Retz, which name must give place to Linnæus's.

A. Gryllus, Am. Acad. iv. 332, from South Europe, is *Chrysopogon Gryllus,* Trin.

A. insulare, l. c. v. 412, is *Panicum leucophæum,* H.B.K.

A. Ravennæ, 2nd edit. p. 1481, is *Erianthus Ravennæ,* P. de B.

A. muticum, l. c. 1482, described from C. B. S., is not in Herb.

A. polydactylon, Am. Acad. v. 412, from Jamaica, is *Chloris polydactyla,* Sw.

A. quadrivalvis, Mant. 303, printed in the margin, by mistake, "*nutans,*" is *Anthistiria ciliata,* Retz.

A. cymbarium, L.! Mant. 303, is the beautiful species of *Cymbopogon* which Sprengel calls *C. elegans.* Sent by Koenig from Ind. or.

A. prostratum, Mant. 304, is *Anthistiria prostrata,* Willd.

A. barbatum, Mant. 302, described from India, is *Chloris barbata,* Sw.

A. scabrum, Linn. Herb.! from Koenig, is *Chamæraphis hordeacea,* R. Br.

A plant from Feuillée, is *Androp. Xanthoblepharis,* Trin. Icon.; and there is also another of *Schisachyrium brevifolium* from the same person.

Holcus, *Sp. Pl.* 1st edit. p. 1047.

1. *H. Sorghum* is *Sorghum vulgare,* Pers.

2. *H. saccharatus* is not in Herb.

3. *H. halepensis,* from Upsal Garden, is *Sorghum halepense,* Pers., awned and unawned.

4. *H. lanatus,* L.!

5. *H. odoratus.* One specimen is *Hierochloë borealis,* R. et Sch.; the other is *Hier. australis.*

6. *H. laxus,* from Virginia, is *Uniola gracilis,* Michx.

7. *H. striatus,* Gron. Virg. 135, is *Panicum gibbum,* Elliot.

H. spicatus, Sp. Pl ed. 2. p. 1483, is *Penicillaria spicata,* Willd. This is also marked "*Alopecurus Indicus*" by Sm.

H. mollis, L.! 2nd edit. p. 1485.

H. latifolius, l. c. 1486, from Asia, Osbeck, is *Centotheca lappacea,* Desv. This is also marked "*Cenchrus lappaceus* and *Bambu Ramp.*"

H. bicolor, Mant. 301, from Persia, is a form of *Sorghum vulgare.* Pers.

H. pertusus, Mant. 301, is *Andropogon pertusus,* Willd.

H. serratus, Linn. Herb., is *Panicum serratum,* R. Br.

APLUDA, *Sp. Pl.* 1st edit. p. 82.

There is much confusion about this genus. The species which appears in 1st edition is first described in 2nd edition Gen. Pl. (1742) as No. 1018, *Ischæmum,* from Scheuchz., and this is the plant described in 5th edition of Gen. Pl. (1754). The plant described in the 6th edition is *Zeugites* in the 8th edition, Schreber's (1789): it is the first *Apluda*; and hence I suppose P. de B. has called ordinary *Apluda, Calamina.*

1. *A. mutica,* L.!

A. aristata, L.! Am. Acad. iv. 303. This is also to be found in Herb. Pluk. i. 188. On one page there is a plant of *Anthistiria prostrata,* Willd.

A. Zeugites, Am. Acad. (1759) v. 412, figured by Browne as *Zeugites* (in 1755), is *Zeugites Americana,* Willd.

A. digitata, Linn. fil. Supp. 434, is *Polytoca bracteata.* Bennett in Pl. Jav. rar.

MANISURIS. Not in 1st or 2nd edit. *Sp. Pl.* Just appears in Mantissa, 300.

M. Myurus, L.! Marked by Koenig "*Ægilops sanguinea,*" and by Linnæus as "*Ischæmum Myurus.*" Is sometimes called *Peltophorus Myurus,* Nees.

ISCHÆMUM, *Sp. Pl.* 1st edit. p. 1049.

1. *I. muticum,* L.!
2. *I. aristatum,* L.! is what is generally called *I. barbatum.* One specimen is *Spodiopogon obliquivalvis,* Nees.

There is one spicula of *I. rugosum,* marked "*Cicadaria,*" from Koenig; and by Smith, "*Ischæmum rugosum,* Salisbury Ic. t. 1."

Ischæmum murinum from Forst., not in Linnæus's handwriting, is *Spodiopogon aureus,* Hook. et Arn. in Bot. of Beechey's Voyage.

There is also a single specimen of *Erianthus aureus,* P. de B., without name or locality; and a plant marked "*Isch. aculeatum,*" which is *Ceytosis aculeata,* Willd.

Cenchrus, 1st edit. *Sp. Pl.* p. 1049.

1. *C. racemosus* is *Lappago racemosa,* Willd.
2. *C. capitatus* is *Echinaria capitata,* Desf.
3. *C. echinatus,* L.! with rather a long spike.
4. *C. tribuloides,* L.! Sent by Kalm from Virginia.
5. *C. frutescens.* Not in Herb.

C. lappaceus, 2nd edit. p. 1488, is not in Herb., and the word is erased by Linnæus in a MS. note.

C. muricatus, Mant. 302. from Koenig, is *Trachys mucronata,* Pers. This is also named "*C. tripsaceus*" and "*Tripsacum distachyon.*"

C. ciliaris, Mant. 302. One from Upsal Garden, and one from C. B. S.; are both *Pennisetum cenchroides,* Richd.

C. granularis, Mant. 575, is *Manisuris granularis,* Sw.

Ægilops, *Sp. Pl.* 1st edit. p. 1050.

1. *Æ. ovata,* L.!
2. *Æ. caudata,* L.!
3. *Æ. squarrosa.* Not in Herb.
4. *Æ. triuncialis,* L.!
5. *Æ. incurvata* is *Lepturus incurvatus,* Trin.

Æ. exaltata, Mant. 575, from Koenig, is *Ophiurus corymbosus,* Gærtn.

Rottbœllia is a genus of Linn. fil., first published in 'Nova Graminum Genera' (1779). The Herbarium contains

R. incurvata, which is *Lepturus incurvatus*;

R. compressa, Linn. fil. Suppl. 114, which is *Hæmarthria compressa,* R. Br.;

R. dimidiata, Linn. fil. Suppl. 114, which is *Stenotaphrum Americanum,* Schrank;

R. exaltata, Linn. fil.! *l. c.* 114.; and

R. corymbosa, Linn. fil. *l. c.* 114, which is *Ophiurus corymbosus,* Gærtn.

Notes on *Caryophylleæ, Portulaceæ,* and some allied Orders.

By George Bentham, Esq., Pres. L.S.

[Read June 6, 1861.]

The series of orders in which natural affinities are the most dissevered by the Candollean arrangement is undoubtedly that of the Curvembryonous group, of which each one appears to be connected with the others by gradations so close that positive limits have very seldom been assigned to any of them, and yet they are necessarily dispersed in the three great classes of Thalamifloræ, Calycifloræ, and Monochlamydæ. Thus we find in the 'Prodromus' that the numerous genera constituting the group are distributed among ten orders:—Caryophylleæ, referred to Thalamifloræ; Paronychiaceæ, Portulaceæ, and Ficoideæ, to Calycifloræ; and Phytolaccaceæ, Salsolaceæ (Chenopodieæ), Basellaceæ, Amarantaceæ, Polygonaceæ and Nyctagineæ, to Monochlamydæ. In this arrangement De Candolle appears to have been sometimes guided by the characters shown in what had been considered as the *typical* genus of each order. But the so-called typical genus of an order, as I believe I have already had occasion to point out to the Society, has not been always the one exemplifying in the most striking degree the characters prevailing in the majority of its co-ordinates, but, on the contrary, has often been remarkably exceptional, having been selected to give its name to the order from being the earliest or the most familiarly known to European botanists. Thus in Portulaceæ, for instance, the supposed typical genus *Portulaca*, having a semi-inferior ovary, determined the position of the order among Calycifloræ. It is, however, in that respect a remarkable exception in the order, all the rest of which (as it is usually limited) is essentially hypogynous. Some Caryophylleous genera are also more perigynous than several of those included by De Candolle in the supposed perigynous order Paronychiaceæ.

To remedy these and similar incongruities, several transpositions have been suggested by those who adhere generally to the Candollean classes. Thus, Asa Gray reduces Paronychiaceæ to a suborder of Caryophylleæ, and removes also Portulaceæ next to them among Thalamifloræ. Harvey and Sonder bring Phytolaccaceæ also up to Thalamifloræ, but leave Portulaceæ and Ficoideæ in Calycifloræ. Lindley rejecting the distinction between Apetalæ and Polypetalæ, has two hypogynous alliances—*Silenales*, consisting of Caryophyllaceæ, Illecebraceæ, Portulaceæ and Polygonaceæ, and *Chenopodales*, consisting of Nyctaginaceæ, Phytolaccaceæ, Amarantaceæ and Chenopodiaceæ; and one perigynous alliance, *Ficoidales*, composed of Basellaceæ, Mesembryaceæ, Tetragoniaceæ and Scleranthaceæ. Endlicher, on the other hand, rejecting the character derived from staminal insertion, but maintaining that founded on the presence or absence of petals, places Mesembryaceæ, Portulaceæ, Caryophyllaceæ and Phytolaccaceæ in one cohors among his Dialypetalæ, and Chenopodiaceæ, Amarantaceæ, Polygoneæ and Nyctaginaceæ in another cohors far away among Apetalæ. All, however, are ready to suggest that in a really natural system all the above orders ought to be brought together, which cannot be done without entirely rejecting the above-mentioned great Candollean classes; yet no substitute has been proposed for these classes, except a vain endeavour so to modify the linear series as to bring allied orders into close approximation. Thus Grisebach, one of the most able advocates for this arrangement (which, with any one for whose views we had less respect, we should be tempted to call a disarrangement), brings indeed all our Curvembryonous orders together, but places them between Euphorbiaceæ and Malvaceæ, which in our view have quite as much right to be placed in close proximity as Caryophylleæ and Chenopodieæ *.

In considering how to deal with these various proposals, we must observe that none of the classes, groups, or alliances so formed are limited by any character that does not undergo many exceptions among the genera placed under them; nor are we able to devise any other that shall be thus strictly and absolutely defined. Even the curvature of the embryo round a farinaceous albumen, the chief character of the whole group, can scarcely be traced in *Dianthus*, in some *Polycarpææ*, in *Anacampseros* and its allies, in some *Polygoneæ*, &c.; and the position of the leaves, the presence or absence of stipules and petals, the number and insertion of the stamens, the relative position of sepals, petals, stamens and carpels, the degree of combination or reduction of the carpels and ovules, are characters so variously combined or dissevered, as always to leave small anomalous genera invalidating or uniting any groups we can form. Our object has therefore been to seek out such limitations as may bring together genera having the greatest general resemblance, and united by such tangible characters as should have the fewest exceptions.

Our first great group is that of the CARYOPHYLLEÆ, the normal characters of which (besides those common to all the above orders) are opposite leaves; sepals, petals, and one or usually two series of stamens, all isomerous; a free one-celled ovary with several ovules in the centre, and formed by the combination of two or more carpels; and a dehiscent or several-seeded fruit. The opposition of the leaves has no exception; the sepals are never reduced, nor the petals increased in number, although the latter are often very much reduced in size, and in a few species totally deficient; the stamens of either series are never increased in number, but occasionally irregularly reduced, or one or the other series deficient; the ovary, if ever divided into cells, is only so at the very base or at a very early stage; the carpels are always closely combined, and in some genera the styles also; both are often reduced in number below that of the other parts of the flower, but never increased, and never reduced to one simple one; and there is only one species where the ovules are reduced to a single one. In the great majority of species the petals and stamens are hypogynous, and if, in a few others, the disk which bears them is perigynous, it is only slightly so; and we therefore concur with other botanists in placing the order among Thalamifloræ. We estimate the total number of good species of Caryophylleæ at about 800, and we distribute them into three tribes: 1. SILENEÆ, with a gamosepalous calyx and free styles; in these the stamens are always hypogynous, and there are no stipules; 2. ALSINEÆ, with free sepals and free styles; in them the stamens are hypogynous or slightly perigynous, and scarious stipules are present only in about half-a-dozen species (*Spergula* and *Spergularia*); and 3. POLYCARPÆÆ, with free sepals and combined styles. The stamens are, as in Alsineæ, hypogynous or slightly perigynous, and the stipules are most frequently, or perhaps always, present.

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* When in this and other similar papers I make use of the plural *we*, with reference to any general views on the principles of distribution and limitation of genera, I refer to those of Dr. Hooker and myself as adopted for the 'Genera Plantarum' we are preparing.

Our next order is that of the PORTULACEÆ, which, with the ovary of Caryophylleæ, is at once distinguished by the remarkable anisomery of the parts of the flower. The sepals are usually 2 only, with petals varying from 3 to 7 or 8; in one species only (*Lewisia*) the sepals are 5 or 6, with 8 to 10 petals. In no case are the petals deficient. The stamens are most frequently more numerous than the petals, and where equal to them in number, or fewer (sometimes only one), they are always opposite to them and adhering to their base. It was this remarkable divergence from the ordinary arrangement of the stamina in the group of orders we are considering, that induced Fenzl to extend the Portulaceæ so as to include all genera where a tendency to a similar arrangement may have been traced or supposed. But whilst we do full justice to the accuracy of Dr. Fenzl's observations on the whole of the curvembryonous orders which he has investigated with so much detail, we cannot concur in the general views he has taken of their delimitation, which, indeed, have not met with general adoption. The disturbance of the ordinary alternation in the different whorls composing the flower is curious in several Caryophylleæ, without our being able to detect any cause or to trace any connexion with other characters: thus the styles are opposite the sepals in *Cerastium,* alternate with them in *Sagina,* and when exceptionally pentagynous, as in *S. aquatica,* in *Stellaria.* The stamens, when reduced to 5, are usually opposite the sepals, but alternate with them in *Colobanthus,* without however being epipetalous or accompanied by any other of the characters of Portulaceæ; and, again, in *Schiedea,* so nearly allied in most respects to *Stellaria,* and having both series of stamens present in their usual position, the petals are opposite the sepals, which does not occur in any other genus of the Curvembryonous group. It has been endeavoured to explain this circumstance by calling the petals staminodia or sterile filaments; but that does not remove the difficulty; for when staminodia do exist in any allied order, they are not, any more than petals, placed as in *Schiedea.*

The Portulaceæ, as we should continue to limit them, have been generally recognized as a natural group. They are more or less succulent. The leaves are alternate or occasionally opposite, but never perhaps so strictly so as in Caryophylleæ; the petals either very fugacious or shrinking very soon into a withered mass, which makes it very difficult in some of the minute-flowered species to ascertain their number or shape from dried specimens. All genera, except *Portulaca* itself, are essentially hypogynous; and in *Portulaca,* where the ovary is half-inferior, the ring bearing the petals and stamens is as closely connected with the ovary as with the calyx; so that if, as has been suggested, the adherent base of the flower be considered as an enlarged concave torus or summit of the pedicel, the insertion of the petals in *Portulaca* may be said to be less truly perigynous than in those Alsineæ where they proceed from a disk lining the base of the calyx and free from the ovary. We therefore have no hesitation in following A. Gray and others, who rank Portulaceæ among Thalamifloræ. The ovary in *Portulacaria* is uniovulate, and becómes an indehiscent 3-winged nest; and in *Silvæa* the fruit is a 1-seeded utricle; but in both genera the flowers are too decidedly Portulaceous to remove them from the family.

The Tetragonieæ and Sesuvieæ, united by Fenzl with Portulaceæ, differ both from them and from Caryophylleæ in their ovary divided into cells, and in their very perigynous stamens.

We would propose to restore them to FICOIDEÆ, where they were placed by De Candolle and others, and from which they chiefly differ in the absence of petals. As they belong most decidedly to Calyciforæ, which we have not as yet worked up in detail, I shall defer for the present any further observations on the genera they consist of.

The MOLLUGINEÆ, also included by Fenzl among Portulaceæ, have been referred by some to Paronychiaceæ on account of their stipules, by others to Caryophylleæ for their capsular fruit. They form a small group, however, which cannot well be attached to either of the allied larger orders without in some measure invalidating their characters. From Caryophylleæ they differ in their alternate stem-leaves (often apparently verticillate, but never really so, nor yet opposite, although the bracts may be so in a few cases), and in their septate ovary and capsule; from Portulaceæ in their isomerous calyx, septate ovary, usual want of petals, and habit; from Ficoideæ in habit and in their stamens usually hypogynous or nearly so; from Phytolaccaceæ, Paronychiaceæ, and other Monochlamydeous orders in the several-seeded cells of their ovary and fruit. They are all apetalous, except *Macarthuria*, *Telephium*, and occasionally *Glinus*, and do not well come in either with Thalamifloræ or Calycifloræ. We think they might be best placed amongst Monochlamydæ next to Phytolaccaceæ, or even incorporated in that order as a tribe, bearing in some measure a relation to the true Phytolaccaceæ similar to that which Celosieæ do to the remaining Amarantaceæ.

The PARONYCHIACEÆ form the link which unites Caryophylleæ with Amarantaceæ. They were formerly distinguished from Caryophylleæ by the supposèd constantly perigynous insertion of the stamens; but this character proving in many instances fallacious, it has been proposed to take the presence of stipules as the ordinal distinction. That, again, separated *Spergula* and *Spergularia* from the closely allied Alsineæ; and Fenzl, A. Gray, and others unite the whole with Caryophylleæ. It appears to me, however, that if we limit Paronychiaceæ to the genera with a uniovulate (although compound) ovary and utricular fruit, we have a distinct group, more nearly allied to Amarantaceæ than to Caryophylleæ, and which, as all except *Corrigiola* are decidedly apetalous, would take its place among Monochlamydæ.

With regard to PHYTOLACCACEÆ, characterized by the ovary consisting of one or usually several annular uniovulate carpels, and to CHENOPODIACEÆ and AMARANTACEÆ, with their vague but universally recognized ordinal distinctions, we leave them for the present as elaborately worked up in the 'Prodromus,' entering only our provisional protest against the useless change in name from Chenopodiaceæ to Salsolaceæ, against the separation of Basellaceæ as an order, against the importance attached to the erect or horizontal seeds, and against much superfluous splitting both of genera and of species upon inconstant characters.

The four orders, either retained among Thalamifloræ or now first transferred to Monochlamydæ, call however for some observations as to the limits of genera which I shall now severally enumerate.

I. CARYOPHYLLEÆ.

The limits of most of the large genera of this order have always been very artificial, and were made to rest by Linnæus chiefly on the number of parts of the flower. As these have been shown to be in some cases very variable, and often quite unconnected with habit or other characters, A. Braun, Fenzl, and others have resorted to the embryo, the venation of the calyx, the dehiscence of the capsule, &c.; and the latter character has been especially relied upon by Fenzl, who has alone investigated specifically the whole order, and worked out a large portion of it with the greatest accuracy of detail. He has not, indeed, been always successful in the new combinations he has formed to replace the old Linnean genera; his distinction between *Arenaria* and *Alsine*, for instance, is not a natural one; but, on the other hand, he has much improved the circumscription of some genera, such as *Gypsophila*, *Cerastium*, &c., and contributed very largely to our accurate knowledge of the various forms assumed by the numerous species, races, and varieties of the order. In determining the limits to be assigned to our genera, we have always found we could place implicit reliance on the characters assigned by him to the species he examined, as well as on those given by A. Braun, J. Gay, and M. Willkomm, who have specially studied portions of the order.

Of the three above-mentioned tribes of Caryophylleæ, the first, SILENEÆ, has been universally recognized as distinctly marked out by the gamosepalous calyx, and has even been raised by many modern botanists to the rank of an independent order. We continue it as a tribe only, and we still think that the large genera of the older botanists, with some slight modifications founded on the capsule, the embryo, or on the venation of the calyx, are as natural as any that have been subsequently proposed. We purpose adopting the following eleven.

* *Semina peltata, hilo faciali. Embryo rectus.*

1. *Velezia*, Linn. 2. *Dianthus*, Linn. 3. *Tunica*, Scop.

** *Hilum marginale. Embryo periphericus.*

4. *Acanthophyllum*, C. A. Mey. 5. *Drypis*, Linn. 6. *Gypsophila*, Linn.
7. *Saponaria*, Linn. 8. *Silene*, Linn. 9. *Cucubalus*, Linn. (ex parte).
10. *Lychnis*, Linn. 11. *Wibelinia*, Hochst.

Dianthus is the most natural and best-defined genus of the whole order. The calyx is peculiar, never angular, but marked by numerous equal parallel ribs—7, 9, or 11 to each sepal, or 35, 45, or 55 in the whole, and is always surrounded at the base by one or more pairs of bracts. Ten stamens, two styles, a capsule opening at the top by 4 teeth or short valves, and seeds much flattened, attached by their inner face, with a straight embryo, complete the distinctive characters, to which we believe there are no exceptions. The species are numerous, but have been enormously multiplied in books, being particularly liable to variation in their bracts, in their showy petals, in the density of the inflorescence, &c. They are moreover said to hybridize in a wild state with the greatest facility; but this is a point which requires much further unprejudiced observation.

Tunica is a group of about 10 species which have been variously distributed in *Dianthus* and *Gypsophila*, or separated into one, two, or three genera. They have the seeds, and in most cases the bracts, of *Dianthus*; but the calyx has either only 5 nerves, as in *Gypsophila*, or at most 2 lateral ones to each sepal, or 15 in the whole. Most of the species, on account of their short calyx and small bracts, were included by Linnæus in *Gypsophila*; one species, however (now often broken up into three), with a long calyx completely enveloped in scarious bracts, was included by him in *Dianthus* (*D. prolifer*, L.), and constitutes the genus *Kohlrauschia* of Kunth. As a solitary species we think it more convenient to retain it in *Tunica*, as there are no very positive characters to separate it. Again, in Fenzl's section *Pseudotunica*, raised by Reichenbach to the rank of a genus under the name of *Fiedlera*, there are no outer bracts, but all the other characters are those of the true *Tunicas*.

Velezia, very near *Tunica* in technical characters, may nevertheless be maintained as an old-established genus, to which the very slender calyx and rigid habit give a peculiar aspect. The

Linnean character of 5 instead of 10 stamens is said not to be quite constant; but I have always found 5 only in the few specimens I have examined.

Acanthophyllum and *Drypis*, with a general affinity to *Saponaria*, are closely connected with each other in their prickly foliage, bracts and calyx-teeth, in their ovary and fruit. The ovules are few; and of these few, seldom more than one attains maturity. The capsule has been described as circumsciss, but in most cases that dehiscence has appeared to me to have arisen from the manner in which the specimens had been dried. In many Sileneæ the upper portion of the capsule assumes a more cartilaginous and stiffer consistence than the lower part; in these two genera it is particularly thick, and opens in valves only very late or not at all, whilst the lower portion, especially if gathered before it is quite ripe, remains thin and herbaceous, so as to break from it with very little force, but I have never seen the upper portion fall off naturally. The characters by which the two genera are distinguished are more artificial. *Acanthophyllum*, containing about a dozen species, has a 5-angled or 5-ribbed calyx, either without any lateral nerves, or one faint one to each sepal, on each side of the midrib; the stamens are usually 10, and the styles 2. In *Drypis*, still limited to the old Linnean species, the calyx has many ribs, with those of adjoining sepals usually free from each other as in Diantheæ, not united as in *Silene* and *Lychnis*; the stamens are usually 5, and the styles 3, although I have not unfrequently observed 2 or 5 styles. *Jordania* of Boissier appears to have the general characters of *Acanthophyllum*, without sufficient difference in habit to maintain it as a distinct genus on account of the capsule more readily splitting into 4 valves.

Gypsophila and *Saponaria*, again, are too closely blended with each other to suffer any positive line of distinction to be drawn between them, a few of the smaller-flowered species being almost equally referable to the one or to the other; yet, as old-established and rather numerous groups with a great majority of well-characterized species, they may still be maintained as separate genera. With the seeds, the 10 stamens, and other general characters of *Silene* and *Lychnis*, they are readily known by the calyx, in which the lateral nerves of adjoining sepals, if present, never amalgamate, and by the styles, which are almost if not quite always two only. They differ from each other chiefly in the calyx, which in *Gypsophila* is usually turbinate or campanulate, not contracted at the top, with 5 usually broad nerves, and is more or less membranous and veinless between them, whilst in *Saponaria* it is tubular or pyramidal or slightly contracted at the top, and, in most cases, even the midrib of each sepal is scarcely conspicuous. In *Gypsophila*, moreover, the capsule opens much more deeply into 4 valves than in *Saponaria*, which has usually only 4 short teeth.

Among the small genera proposed by various authors which we do not consider sufficiently distinct to adopt, *Banffya*, Baumg., and *Dichoglottis*, Fisch. and Mey., are chiefly distinguished by inflorescence; *Heterochroa*, Bunge (*Acosmia*, Benth. in Wall. Cat.), by the more deeply cleft calyx; and *Ankyropetalum*, Fenzl, by the rigid habit and small narrow calyx, which bring it very near to the small-flowered *Saponarias*. *Vaccaria*, Medik., a single widespread cornfield weed, appears to have been better placed by Linnæus in *Saponaria*, than by more modern botanists in *Gypsophila*.

The two large genera *Silene* and *Lychnis* are distinguished from all the preceding ones, except the single species of *Drypis*, by the styles, which are universally (except perhaps in very rare anomalous flowers) more than two, and by the calyx, which, in all but the very few conical *Silenes*, has ten more or less prominent nerves, the two lateral ones of adjoining sepals being constantly blended into one. But the limits between the two genera are less natural and less accurately defined. The Linnean character of 3 styles in *Silene*, and 5 or rarely 4 in *Lychnis*, although not quite constant, is perhaps even now the best that has been proposed, and the very few species where these numbers are slightly variable must be referred to that genus with which the great majority of their flowers agree.

With regard to their subdivision, many natural groups have been formed, which, especially in the case of *Lychnis*, have been frequently raised to the rank of genera. But the most marked are generally single species; and others, if tolerably defined in one genus, have their corresponding forms in the other, passing gradually into different groups. We therefore cannot at present see any course more in conformity to our general principle than to qualify the greater number of them as more or less artificial sections only of two artificial but large genera. I shall proceed to enumerate the most important.

Cucubalus, intended by Linnæus to include a number of *Silenes* with very inflated calyces, but since restricted to the *S. baccifer*, in which the fruit, although not exactly a berry, has the appearance of one, and does not open in valves, may still be conveniently retained as a genus; for that very decided and exceptional character is accompanied by considerable differences in the general aspect as well of the flower as of the whole plant.

Heliosperma, Reichb., proposed for a few small white-flowered *Silenes* with very muricate seeds, and *Elisanthe*, Fenzl, adopted by Willkomm for the species with laciniate petals, usually red, though both well marked in a very few cases, are too closely connected through others with the great mass of the genus to form more than sections, and even as such are not so good as *Conoimorpha*, for instance, and *Behenanthe*.

Melandrium, Roehl., has about a dozen species of *Lychnis*, chiefly northern or alpine, with inflated calyxes, and the teeth or valves of the capsule splitting into two so as to become double in number to the styles. But the calyx in some species passes gradually into that of *Lychnis* proper, and the splitting of the capsule-teeth in others is exceedingly slight, and we cannot attach much importance to it in this any more than in other Caryophylleous genera.

Viscaria, Roehl., was originally proposed for a few species in which the ovary is shortly divided at the base into 5 cells—a slight rudimentary indication of the typical formation of the gynæcium, of little more importance here than in the few *Silenes* and *Dianthuses* in which it occurs. Two of the four *Viscarias* have been again separated under the name of *Eudianthe*, as having the capsular teeth split. These formed part of *Agrostemma*, Linn., characterized by the long narrow calyx-teeth. The latter name has now been restricted to a single species only differing from *Lychnis* proper by those calyx-teeth and by the stiffness of the scales at the base of the petals; and another *Agrostemma* of Linnæus has been erected into the genus *Githago*, as having the styles alternating with, not opposite the sepals—a circumstance very difficult to ascertain with certainty in the gamosepalous genera, especially in the dried state, and which, if correct, may be due to a slight torsion of the torus.

Petrocoptis, A. Braun, comprising two Pyrenæan species, has a more definite character in the expansion of the funiculus into a small strophiola; but the habit is not very marked, and there is no other character. The æstivation of the petals is indeed said not to be contorted as in other Caryophylleæ, but it certainly is so occasionally, and a few other species of *Lychnis* have been observed where the contorted arrangement is sometimes broken. I have also myself seen it so not unfrequently in *Stellaria holostea*, and it probably occurs in other instances.

Uebelinia, Hochst., a single Abyssinian species, may, however, have sufficient claims to be admitted as a genus. Besides the reduction of the stamens to 5, the shape of the calyx, the habit, and inflorescence are very different from those of *Lychnis*, reminding one of *Gypsophila cerastioides*. The calyx has 10 ribs, and the styles are 5 as in *Lychnis*.

The numerous species of the tribe ALSINEÆ have always been found very difficult to divide into natural genera with definite characters. For those without stipules more than thirty have been proposed, of which, however, we think it most convenient to adopt the following eleven only: 1. *Holosteum*, Linn.; 2. *Cerastium*, Linn.; 3. *Stellaria*, Linn.; 4. *Brachystemma*, Don; 5. *Arenaria*, Linn.; 6. *Buffonia*, Linn.; 7. *Sagina*, Linn.; 8. *Colobanthus*, Bartl.; 9. *Thylacospermum*, Fenzl; 10. *Schiedea*, Cham. et Schlecht.; and 11. *Queria*, Linn.; and to these we add the two stipulate genera—12. *Spergula*, Linn., and 13. *Spergularia*, Pers. Of these genera the four principal ones were supposed to have been well defined by the earlier botanists—*Cerastium* by 5 styles and bifid petals, *Stellaria* by 3 styles and bifid petals, *Arenaria* by 3 styles and entire petals, *Sagina* by 4 styles and entire petals. But in each case species have been since observed where these characters have not proved constant, or where their strict adoption has occasioned severances too purely artificial to be maintained, and others have been successively called in aid.

In *Cerastium*, the form of the capsule (its elongated apex always shortly and regularly divided into twice as many teeth as styles) appears not only the best corroborative character, but even to take precedence over those derived from the divided petals and number of styles, as being more in conformity with general habit. We would thus, with Fenzl, bring into *Cerastium* the *Stellaria cerastioides*, Linn., and *S. viscida*, Bieb., although they have the 3 styles of *Stellaria*, as well as the small genus *Mœnchia*, in which the petals are entire or notched only and the flowers isomerous throughout as in *Sagina*, although the styles are opposite the sepals as in *Cerastium*. The two species referred to *Mœnchia*, the one with 4-merous, the other with 5-merous flowers, were therefore formerly placed, the first in *Sagina*, the other in *Cerastium*, but it is now generally believed that they are mere varieties of one species. Again, the *Arenaria purpurascens*, Ram., a Pyrenæan plant with much of the habit of *Cerastium trigynum* (*Stellaria cerastioides*), but with the petals and styles of *Arenaria*, and proposed as a distinct genus under the name of *Dufourea*, might, on account of the capsule, be better referred to *Cerastium*, where Fenzl once placed it.

Holosteum is a small genus, most elaborately described by J. Gay, and reducible, as he proposes, to two or even to a single species. It has the capsule of *Cerastium*, but may be maintained as distinct on account of the habit and inflorescence and the peculiar seed. This is flattened from front to back as in *Dianthus* and its allies, but the radicle, instead of being short and straight as in those genera, is turned down in a projection of the inner face by which the seed is attached, thus combining the two forms of embryo which prevail in Caryophylleæ.

Stellaria is a large and widely spread genus, tolerably natural, and, as to the large majority of species, well marked by the three styles, bifid petals, and the capsule divided to about the middle into as many entire or bifid valves. But there are a few anomalous species, mostly isolated or nearly so, which have been separated into distinct genera upon real or fancied discrepancies, which however we think ought, from the general concordance of characters, to be retained in *Stellaria*. These are—

1. *Larbrea*, A. de St. Hil., founded on *S. uliginosa*, which has the petals and stamens more distinctly perigynous than in most other species, though still very slightly so; but this is a question of degree only, as a more or less distinct perigyny may be observed in several other species where the petals are much reduced.

2. *Malachium*, Fries, has been generally adopted for the *S. aquatica*, placed by Linnæus in *Cerastium* as having 5 styles. It differs, however, from that genus in the styles being alternate with, not opposite to, the sepals. The habit, petals, &c., are those of *Stellaria nemorum*; the capsule only differs in the valves being rather less deeply bifid; and the number of styles is, in Indian specimens, not unfrequently reduced to three as in other *Stellarias*.

3. *Krascheninikowia*, Turcz., was adopted by Fenzl as distinguished by the petals emarginate only or shortly bifid, although the original Siberian *K. rupestris* is apparently identical with the Carpathian *Stellaria bulbifera*, and very nearly allied to some other eastern or South-European species. The genus has, however, since been remodelled by Maximowicz and made to rest on dimorphous flowers, the apparently perfect ones in the East-Asiatic specimens being usually sterile, whilst the seeds are produced by small, almost apetalous oligandrous flowers near the base of the stem. But this, although, as far as I am aware, the first

case of dimorphism observed in the flowers of Caryophylleæ, has now been ascertained to exist in so many different Polypetalous orders, and to be so frequently not even of specific value, that we cannot admit it as a generic character when unaccompanied by any other.

4. *Leucostemma*, Benth., was a genus I originally proposed for two Himalayan species with tetramerous flowers, at a time when the number of parts was still considered as of absolute value in the generic distinction of Caryophylleæ; but Fenzl has since very properly reduced them to *Stellaria*, of which they have all the other characters.

5. *Adenonema*, Bunge, containing a few high alpine Asiatic and South-American species, differs from *Stellaria* as *Cherleria* from *Arenaria*, by its short densely tufted stems, the excessively reduced petals, and more developed glands of the disk; and the same arguments which have induced many botanists to reduce *Cherleria* to *Arenaria* (or *Alsine*) would equally apply to the reunion of *Adenonema* with *Stellaria*, especially as the passage from the one to the other is gradual.

6. *Schizotechium*, Fenzl, although only proposed as a section of *Stellaria*, might have perhaps rather more claims than any of the preceding to be adopted as a genus. It consists of two Himalayan species with a scandent habit and diffuse panicles, almost as in *Brachystemma*, and only 3 ovules, of which but one ripens. The ovary might thus be supposed to be reduced to uniovulate carpels, and to be brought technically nearer to that of Phytolaccaceæ; but there is no central axis, and a slight comparison of actual specimens will at once give the idea that it is an exceptional and irregular reduction in the ovules of a closely compound ovary, and not a normal conformity of the ovules with as many distinct or well-marked carpels. The foliage, inflorescence, and flowers are in all other respects those of *Stellaria*, in which genus we continue to retain *Schizotechium* as a section.

Brachystemma, Don, to which we have just alluded as resembling *Schizotechium* in habit, is a single Himalayan species with the entire petals of *Arenaria*. The stamens, of which 5 only bear anthers, the 2 styles, 4 ovules, and usually one-seeded capsule, may also be found occasionally in that genus; but all these features being united and accompanied by a different habit, a large scarious calyx with minute petals may warrant us in retaining it as a distinct genus.

We now come to the great genus *Arenaria*, whose limits are the most puzzling to define among the whole range of Caryophylleæ. Originally characterized by 5 sepals, 5 entire petals, 10 or rarely 5 stamens, and 3 styles, it was subsequently found that these numbers were liable to variation, that in some species the petals were excessively reduced or disappeared altogether, in others the styles were frequently reduced to 2, and that characters derived from number could no longer exclude the Linnean genera *Cherleria, Minuartia, Mœhringia*, &c., whilst on the other hand the capsule appeared to afford means of dividing the whole group in a more definite manner. Accordingly the greater number of species have been distributed into three principal genera, *Arenaria, Mœhringia*, and *Alsine*; and at least ten others have been proposed, chiefly for individual species in which some striking peculiarity has been observed. But a further consideration of the results has convinced us that the three large groups are far too unnatural to be considered as more than artificial sections; and that the prominent characters of the monotypic genera differ but in degree from those exemplified in other species. *Spergularia* alone forms an exception, and is generally admitted; for although the presence of stipules is its only positive character, its affinity is evidently much more with *Spergula* than with *Arenaria.*

Arenaria itself is limited by Fenzl and others to those species in which the capsular valves are more or less deeply divided so as to become double the number of the styles, and the seeds are without any strophiola; *Mœhringia* has a similar capsule, but the seeds are smooth and shining, with the funicle expanded into a strophiola; and *Alsine* has the capsular valves entire, of the same number as the styles. These characters are tolerably definite, and not liable to much variation in the same species, and therefore excellent for sectional distinction. But when it is considered that *A. Ledebouriana, A. Roylei*, and their allies are in *Arenaria*, whilst *A. laricifolia, A. pinifolia*, &c., are in *Alsine*,—that *A. pubescens, A. hispida*, and *A. diffusa*, Ell. (*A. nemorosa*, H. B. et K.), go togegether in *Arenaria*, whilst *A. trinervis, A. bavarica*, and *A. lateriflora* are in *Mœhringia*,—that *A. polygonoides* is in *Mœhringia* and *A. procumbens* in *Alsine* (or in *Rhodalsine* of Gay),—that *A. modesta, A. conimbricensis*, &c., are retained in *Arenaria*, whilst all their nearest allies belong to *Alsine*, and that the alpine cæspitose species are also distributed between the two, these sections can scarcely be considered as better genera than the old Linnean one.

The characters upon which the smaller, mostly monotypic genera *Cherleria, Siebera, Minuartia, Dolophragma, Triplateia, Gouf-*

feia, *Lepyrodiclis*, *Odontostemma*, *Honckeneya*, and *Merckia* have been founded are chiefly,—unisexuality, absence of petals, a great development of the glands of the disk, the division of the ovary into 3 cells, the complete separation of the capsular valves to the base, or a reduction in the number of stamens, styles, or ovules.

Unisexuality, or rather polygamy, has been much relied on for the genus *Honckeneya*, made for the *A. peploides*. But although in Europe and Asia the plant is certainly most frequently unisexual, yet in America it is generally, and according to A. Gray universally, hermaphrodite, without there being any other distinction between the two races.

The absence of petals induced Linnæus to separate *Cherleria* and *Minuartia*; but this absence has been since shown not to be constant, and other species closely allied to the one or to the other in habit have very minute petals, which again, through other species, pass into those of more conspicuous size; and accordingly Fenzl and others have already united these two genera with *Alsine*.

The glands of the disk are more or less developed in many *Arenarias*, but are only taken as generic characters as being specially prominent in *Cherleria* and in *Honckeneya*, two species which have nothing else to connect them but what is common to the whole genus *Arenaria*.

The division of the ovary into three cells is relied upon for *Dolophragma*, *Honckeneya*, and *Merckia*; and if it were constant and persistent, and only to be seen in the two latter, it might be made use of to separate them, as they have also in common a larger, almost succulent globular capsule, and some affinity in habit. But the dissepiments are only to be found at a very early stage; they are always very thin and slender, and have generally disappeared by the time the flower has expanded, and I at least have never found any remains of them when the capsule is ripe. This division into cells can therefore only be regarded as rudimentary; it may be traced here and there throughout Caryophylleæ, and, as in other cases of undeveloped rudimentary organs, no further systematic value can be attributed to it than as an indication of the normal type, of which the Caryophyllaceous ovary is a modification.

The valves of the capsule separate to the base and spread out horizontally in *Triplateia*. But the depth to which the capsule splits is very variable in the whole genus; and, in the single *Triplateia* known, there is nothing marked in habit to distinguish it from some *Mœhringias*, whilst any other exceptional characters which it possesses are also to be found in species which have not the same capsule or habit.

The stamens are reduced to 5 in *Triplateia*, in a few *Alsines*, and occasionally in other species which have little else in common with them.

The styles and, consequently, the carpels are reduced to 2, and the ovules to 4, with a depressed globular capsule, in *Gouffeia*, *Lepyrodiclis*, and *Odontostemma*, and this brings these four species (*Lepyrodiclis* having two) technically as near to *Buffonia* as to *Arenaria*; but their habit is so dissimilar from each other (except that of *Odontostemma* to one species of *Lepyrodiclis*), and that of two of them so near to that of two corresponding species of *Arenaria* proper, that they can only form a very artificial group, which we prefer to consider as a section of *Arenaria*, where a similar but less constant reduction of carpels or of ovules occurs in other very dissimilar species.

It might be said that where two or three of these exceptional characters are combined, such as the split capsule and reduced ovules and stamens in *Triplateia*, or unisexuality, large glands, and rudimentary dissepiments in *Honckeneya*, they might warrant generic separation; and so it would be if any such plant had these characters exclusively, or if they were similarly combined in several species having some general features in common; but as neither is the case in any of the above instances, we can only consider the plants so isolated as exceptional species, not as separate groups.

To the numerous small genera above enumerated as separated from *Arenaria* on insufficient grounds, we may add the following nine proposed or adopted by Reichenbach on still more trifling characters: *Sabulina*, *Tryphane*, *Facchinia*, *Alsinanthe*, *Neumayera*, *Wierzbeckia*, *Plinthine*, *Pettera*, and *Eremogone*.

With regard to *Buffonia*, it is with much hesitation that we have retained it as a small distinct genus; for the distinctive characters are very slight; and although the four (5 or 6 ?) species which compose it have much resemblance in habit, they also come very near to some of the small-flowered fine-leaved *Arenarias*.

Sagina was formerly a purely artificial genus, comprising all the tetramerous Alsineæ; but as some of these have been shown to be mere varieties of pentamerous species placed in *Cerastium* or in *Spergula*, the genus has been remodelled by Fenzl, so as to exclude *S. erecta* and to include those *Spergulas* of Linnæus which have no stipules. It has thus become much more natural, and although still very nearly allied to some of the smaller *Arenarias*, it is well characterized by the styles, whether 4 or 5, always isomerous with the sepals, and alternating with, not opposite to them as in *Cerastium*, and as in the old *Sagina* (or *Mœnchia*) *erecta*, now transferred to *Cerastium*, of which it has also the capsule. The pentamerous *Saginas* have been proposed by some German authors as a distinct genus under the name of *Spergella*; but the character is purely artificial, and not always constant in the same species.

The four remaining small genera of exstipulate Alsineæ have each some remarkable peculiarity of structure which has occasionally suggested their respective removal to some other order, but their general affinities are clearly with Alsineæ, and I have already alluded to the insufficiency of these peculiarities for their removal. Thus, *Colobanthus* has no petals, and the stamens, of the same number as the sepals, are alternate with, not opposite to them; but the remaining characters and habit are those of *Sagina*: *Thylacospermum* only differs from the low tufted alpine Cherlerioid *Arenarias* by the calyx forming an obconical tube at the base, round the margin of which are inserted the stamens, which are thus, exceptionally, very perigynous: *Schiedea*, with the habit and most of the characters of some *Stellarias*, is distinguished by the remarkable position of the petals (or staminodia ?) opposite the petals, already alluded to: and *Queria*, very near some of the smaller annual *Arenarias*, has only one ovule and no petals, and thus passes into Paronychiaceæ; but as the fruit is a three-valved capsule and not a utriculus, I have preferred retaining it among Alsineæ.

The stipulate Alsineæ comprise two genera of three or four species each—*Spergula*, Linn., and *Spergularia*, Pers. (*Lepigone*, Fries)—differing by their stipules only, the first from *Sagina*, the second from *Arenaria*. This character, admitted as ordinal by some botanists who transfer these genera to Paronychiaceæ, is rejected by others even as generic, as being derived from vegetative organs alone. Estimating its value from its practical relation to habit, we are induced in this instance to consider it as generic, placing *Spergula* and *Spergularia* in the tribe of Alsineæ, of which they have the free styles, rather than with the other stipulate Caryophylleæ which form our tribe of Polycarpeæ.

Balardia, Cambess., is a South-American *Spergularia* with reduced petals and stamens, and has been correctly referred to that genus by Fenzl and others.

The Caryophylleæ of our third tribe, POLYCARPEÆ, with free sepals and the styles more or less united, are almost all stipulate.

They comprise the eleven following genera :—1. *Drymaria,* Willd.; 2. *Polycarpon,* Linn.; 3. *Ortegia,* Linn.; 4. *Lœflingia,* Linn.; 5. *Cerdia,* Moç. et Sess.; 6. *Pycnophyllum,* Remy; 7. *Lyallia,* Hook. fil.; 8. *Microphyes,* Philippi; 9. *Stipulicida,* Rich.; 10. *Polycarpæa,* Lam.; and 11. *Sphærocoma,* Anders. Very few of these require any special observations.

Arversia, Cambess., or *Hapalosia,* W. et Arn., ought in our opinion to be reduced to *Polycarpon.* The embryo is indeed straighter in *Arversia* (*Hapalosia*) *Lœflingii* than is usual in *Polycarpon,* but it is very variable in the undoubted species of the latter genus, and I have in vain searched for the spiral twist in the valves of the capsule supposed to characterize the typical *P. tetraphyllum.*

Stichophyllum, Philippi, figured in his 'Flora of Atacames,' proves, on examination of his specimens, to be identical with one species of *Pycnophyllum,* Remy. The same plant in Meyen's collection received from Presl the manuscript name of *Xeria Meyeniana,* and is, according to Walpers, the *Arenaria bryoides,* Willd.

Lyallia, Hook. fil., is but very imperfectly known, and is only placed here from its close resemblance in habit to *Pycnophyllum.*

Cerdia, Moç. et Sess., is only known from DeCandolle's characters taken from Moçino and Sesse's drawing.

Polycarpæa, Lam. (proposed by Webb to be spelt *Polycarpia,* but perhaps without sufficient grounds for disturbing the established orthography), is now a large genus divisible into several groups, some of them distinguished by habit without characters, and others which have more definite characters have so precisely the aspect of the typical *Polycarpæas* that we cannot adopt them as separate genera. I allude especially to the two supposed Australian genera, *Aylmeria,* Mart., and *Planchonia,* J. Gay. The former closely resembles the common *P. corymbosa,* but the flowers are rather larger and more scarious, and there are 5 minute staminodia alternating with the stamens at the base of the petals. In *Planchonia,* of which we have five or six species, the flowers are often still larger and more scarious; there are no staminodia; but the petals and stamens are united, sometimes above the middle into a long tube, sometimes at the base only into a shorter cup. Yet striking as the character is in some species, it is one of degree only, and a slight union may be observed in some other non-Australian species.

Sphærocoma, T. Anders., like *Queria,* is intermediate between Caryophylleæ and Paronychiaceæ. The fruit is an indehiscent utriculus as in the latter order; but the presence of petals, and the two ovules with the funicles united in a central columella, show more affinity with Caryophylleæ.

II. PORTULACEÆ.

This Order, once more reduced by most botanists to its abovementioned original and natural limits, consists at present of about 125 species distributed into the following 14 genera:—1. *Portulaca*, Linn.; 2. *Portulacaria*, Jacq.; 3. *Grahamia*, Gill.; 4. *Talinopsis*, A. Gray; 5. *Anacampseros*, Linn.; 6. *Talinum*, Adans.; 7. *Calandrinia*, H. B. et K.; 8. *Claytonia*, Linn.; 9. *Spraguea*, Torr.; 10. *Monocosmia*, Fenzl; 11. *Montia*, Linn.; 12. *Silvæa*, Philippi; 13. *Calyptridium*, Nutt.; and 14. *Lewisia*, Pursh.

Of the above genera, *Portulaca*, comprising a considerable number of species, and *Portulacaria* and *Lewisia*, each of a single species, are too well marked by the exceptional characters already alluded to (p. 58) to admit of any doubt. *Grahamia* from Chili and *Talinopsis* from New Mexico, both monotypic, and *Anacampseros* from South Africa, consisting of about eight species, are closely connected by their nearly straight or slightly curved (not annular) embryo with very little albumen, and by some general resemblances in their flowers; yet, as slight differences in the calyx and bracts accompany considerable diversity in habit and a wide geographical separation, they may be maintained as distinct genera, unless the discovery of intermediate species should hereafter connect them more closely.

Talinum, *Calandrinia*, and *Claytonia* are also very closely allied to each other, being only separated by the sepals, deciduous in *Talinum*, persistent in the two others, or by the stamens, constantly 5 (one opposite each petal) in *Claytonia*, anisomerous with the petals and usually more numerous in *Talinum* and *Calandrinia*. These characters are moreover not quite constant; yet, as each group comprises a considerable number of species bearing other general resemblances to each other, we feel that it would not be safe to recommend their union into one genus without a more detailed examination of every species than can be undertaken on the present occasion.

Spraguea, a single Californian species, is nearly allied to *Claytonia*; but the remarkable calyx gives it so peculiar an aspect, that we do not venture to reduce it.

Montia, also monotypic, is, however, very distinctly characterized by its stamens (usually 3) inserted in the tube of a gamopetalous corolla.

The three remaining genera—*Silvæa*, said to consist of four species (of which I have only seen and examined one), and *Monocosmia* and *Calyptridium*, both monotypic—agree in their very small monandrous flowers; but evident differences in their inflorescence and sepals, and alleged ones in their corollas, which, on account of their extreme tenuity and rapid fading, I am unable to verify with certainty in dried specimens, have induced me to maintain them as distinct.

Baitaria, Ruiz et Pav., is one of the dwarf alpine species of *Calandrinia*, of which the bracts have been described as outer sepals. *Diazia*, Philippi, described and figured from a single very imperfect specimen, is probably also a species of *Calandrinia* with the stamens very much reduced in number. At any rate, should it hereafter prove distinct, the name must be altered, as too closely resembling *Diasia*, an Irideous genus.

Fouquiera, H. B. et K. (including *Bronnia*, H. B. et K.), connected by some authors with Portulaceæ, by others with Polemoniaceæ, is perhaps more nearly related to some of the Calyciflorous groups connected with Saxifragaceæ, which we reserve for future consideration.

III. MOLLUGINEÆ.

This small group, whether considered as a tribe of Phytolaccaceæ or as an allied order, ought, in our opinion, to be limited to the following seven genera:—1. *Macarthuria*, Endl.; 2. *Telephium*, Linn.; 3. *Orygia*, Forsk. (*Axonotechium*, Fenzl); 4. ? *Glinus*, Linn.; 5. *Mollugo*, Linn.; 6. *Pharnaceum*, Linn. (*Ginginsia*, DC.; *Hyperteles*, E. Mey.); 7. *Cœlanthium*, E. Mey. In the four first genera petals are occasionally, or, in two or three species, always present; the three others, forming the great proportion of the tribe or order, are always apetalous. The total number of species is, however, not above 40.

Macarthuria was originally referred to the vicinity of Buettneriaceæ, but upon what grounds it is very difficult to imagine; the very imbricate sepals, the insertion of the stamens, the habit, &c., being so totally at variance with all the Malvoid orders. Harvey first pointed out (Kew Journ. Bot. vii. 55) its affinity with Phytolaccaceæ, and F. Müller has, I believe (although I am unable now to find a reference to his note), referred it to Mollugineæ. One species has always petals, another is quite apetalous; the ovary, styles, capsule, and seeds are quite those of Mollugineæ. The stamens appear to be always 8 in an otherwise pentamerous flower; but this want of symmetry between the number of stamens and that of the petals or sepals is very common in the whole group.

Telephium is exceptional among Mollugineæ, in that the ovary is divided into cells at the base only, but the dissepiments, short as they are, are firm and persistent; the sepals, petals, and stamens are isomerous, and the stamens are opposite the sepals, as in several Caryophylleæ; but the alternate leaves, the inflorescence, the consistence of the sepals, and other characters are those of Mollugineæ, and a very cursory comparison with *Orygia* shows a very intimate connexion of the two genera.

Orygia (a single species, dispersed over the hot dry regions of Africa and Asia) has indefinite stamens surrounded by narrow-linear petals, very variable in number or occasionally entirely wanting, and which are by some termed staminodia or barren stamens. In this respect the genus approaches *Glinus*, whilst the foliage, habit, and inflorescence are very nearly those of *Telephium*, under which genus it has sometimes been classed.

Glinus forms so gradually the passage from *Orygia* to *Mollugo*, that it is hard to assign to it precise limits; the common species has usually indefinite stamens (between 10 and 20) as in *Orygia*, but clustered axillary flowers as in several *Mollugos*, whilst the woolly indumentum and the large calyxes give it a very different aspect from the latter genus. A second species (or, according to some, a small-flowered variety only) has the reduced stamens of *Mollugo*, but the aspect of *Glinus*; and the *Mollugo spergula* of Linnæus, with the small glabrous flowers and few stamens of *Mollugo*, is considered by Fenzl as a third species of *Glinus*, of which it has the strophiolate seeds. The inflorescence is rather that of *M. verticillata* (which has no strophiola to the seeds) than of *Glinus*. This gradual connexion might suggest the propriety of considering *Glinus* altogether as a section only of *Mollugo*, which, after all, would only contain about a dozen species.

Pharnaceum is a Cape genus of about eighteen species, distinguished from *Mollugo* chiefly by fimbriate stipules and a peculiar habit. Several of the species have also a cupular hypogynous disk within the stamens, but this is not constant even in all the species considered as true *Pharnacea*. A small section, *Hyperteles*, E. Mey., retained by Harvey and Sonder as a distinct genus, has no disk and indefinite stamens; an increase, however, in the number of stamens beyond 5 occurs in some species considered as true *Pharnacea*, and the habit of the two sections is the same.

Cœlanthium, limited to two Cape species, differs from *Pharnaceum* as *Thylacospermum* from *Arenaria*, by the union of the sepals at the base into a campanulate tube, round the edge of which are inserted the stamens, being thus much more decidedly perigynous than in the rest of the group.

The genera *Psammotrophe*, Eckl. & Zeyh., and *Polpoda*, Presl, with uniovulate cells to the ovary, enumerated by Fenzl among Mollugineæ, appear to have nothing to distinguish them from true Phytolaccaceæ. *Adenogramma*, Presl, is also a Phytolaccaceous plant allied to *Giesekia*, where the ovary and fruit are reduced to a single one-seeded carpel, not compounded of 2 or 3 carpels although one-seeded as in Paronychiaceæ. *Acrossanthes*, on the other hand, both in habit and character, belongs to the apetalous Ficoideæ.

IV. PARONYCHIACEÆ.

Without having sufficiently examined all the genera of this Order to ascertain their limits with respect to each other, or the order of their arrangement, we have, however, verified the ordinal characters in all the following (except *Cardionema*):—

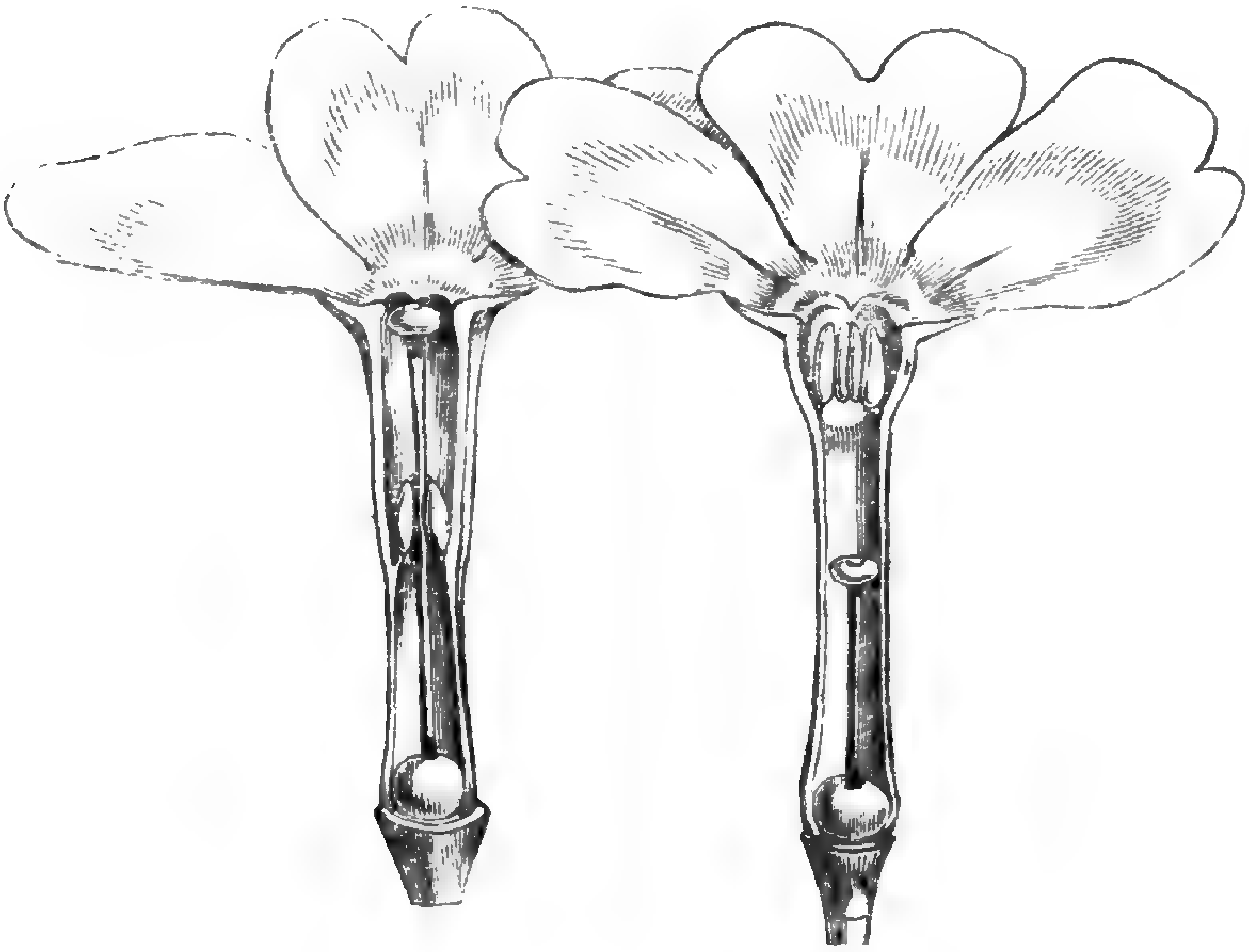
1. *Corrigiola*, Linn. (an exceptional genus in its prominent petals and alternate leaves); 2. *Herniaria*, Linn.; 3. *Illecebrum*, Linn.; 4. *Cardionema*, DC.; 5. *Pentacæna*, Bartl.; 6. *Paronychia*, Juss. (including *Siphonychia*, Torr. et Gray, and *Anychia*, Rich., and perhaps altogether, with *Cardionema* and *Pentacæna*, artificial sections of *Illecebrum*); 7. *Habrosia*, Fenzl; 8. *Sclerocephalus*, Boiss.; 9. *Gymnocarpos*, Forsk.; 10. *Pteranthus*, Forsk.; 11. *Cometes*, Burm.; 12. *Dicheranthus*, Webb; 13. *Pollichia*, Soland.; 14. *Guilleminea*, H. B. et K.; 15. *Mniarum*, Forst.; 16. *Scleranthus*, Linn.; and 17. *Lastarriea*, A. Gay.

On the Two Forms, or Dimorphic Condition, in the Species of *Primula*, and on their remarkable Sexual Relations. By CHARLES DARWIN, M.A., F.R.S., F.L.S., &c.

[Read Nov. 21, 1861.]

If a large number of Primroses or Cowslips (*P. vulgaris* and *veris*) be gathered, they will be found to consist, in about equal numbers, of two forms, obviously differing in the length of their pistils and stamens. Florists who cultivate the Polyanthus and Auricula are well aware of this difference, and call those which display the globular stigma at the mouth of the corolla "pin-headed" or "pin-eyed," and those which display the stamens "thumb-eyed." I will designate the two forms as long-styled and short-styled. Those botanists with whom I have spoken on the subject have looked at the case as one of mere variability, which is far from the truth.

In the Cowslip, in the long-styled form, the stigma projects just above the tube of the corolla, and is externally visible; it stands high above the anthers, which are situated halfway down the tube, and cannot be easily seen. In the short-styled form the anthers are attached at the mouth of the tube, and therefore stand high above the stigma; for the pistil is short, not rising above halfway up the tubular corolla. The corolla itself is of a different shape in the two forms, the throat or expanded portion above the attachment of the anthers being much longer in the long-styled than in the short-styled form. Village children notice this difference, as they can best make necklaces by threading and slipping the corollas of the long-styled flowers into each other. But there are much more important differences. The stigma in the long-styled plants is globular, in the short-styled it is depressed on the summit, so that the longitudinal axis of the former is sometimes nearly double that of the latter. The shape, however, is in some degree variable; but one difference is persistent, namely, that the stigma of the long-styled is much rougher: in some specimens carefully compared, the papillæ which render the stigmas rough were in the long-styled form from twice to thrice as long as in the short-styled. There is another and more remarkable difference, namely, in the size of the pollen-grains. I measured with the micrometer many



Long-styled. Short-styled.

specimens, dry and wet, taken from plants growing in different situations, and always found a palpable difference. The measurement is best made with grains distended with water, in which case, the usual size of the grains from short-styled flowers is seen to be $\frac{10-11}{7000}$ of an inch in diameter, and those from the long-styled about $\frac{7}{7000}$ of an inch, which is in the proportion of three to two; so that the pollen-grains from the short stamens are plainly smaller than those from the long stamens which accompany the short pistil. When examined dry, the smaller grains from the long-styled plants are seen under a low power to be more transparent than the larger grains, and apparently in a greater degree than can be accounted for by their less diameter. There is also a difference in shape, the grains from the short-styled plants being nearly spherical, those from the long-styled being oblong with the angles rounded; this difference in shape disappears when the grains are distended with water. Lastly, as we shall presently see, the short-styled plants produce more seed than the long-styled.

To sum up the differences:—The long-styled plants have a much longer pistil, with a globular and much rougher stigma, standing high above the anthers. The stamens are short; the grains of pollen smaller and oblong in shape. The upper half of the tube of the corolla is more expanded. The number of seeds produced is smaller.

The short-styled plants have a short pistil, half the length of the tube of the corolla, with a smooth depressed stigma standing beneath the anthers. The stamens are long; the grains of pollen are spherical and larger. The tube of the corolla is of the same diameter till close to its upper end. The number of seeds produced is larger.

I have examined a large number of flowers; and though the shape of the stigma and the length of the pistil vary, especially in the short-styled form, I have never seen any transitional grades between the two forms. There is never the slightest doubt under which form to class a plant. I have never seen the two forms on the same plant. I marked many Cowslips and Primroses, and found, the following year, that all retained the same character, as did some in my garden which flowered out of their proper season in the autumn. Mr. W. Wooler, of Darlington, however, informs us that he has seen the early blossoms on Polyanthuses which were not long-styled, but which later in the season produced flowers of this form. Possibly the pistils may not in these cases have become fully developed during the early spring. An excellent proof of the permanence of the two forms is seen in nursery gardens, where choice varieties of the Polyanthus are propagated by division; and I found whole beds of several varieties, each consisting exclusively of the one or the other form. The two forms exist in the wild state in about equal numbers: I collected from several different stations, taking every plant which grew on each spot, 522 umbels; 241 were long-styled, and 281 short-styled. No difference in tint or size could be perceived in the two great masses of flowers.

I examined many cultivated Cowslips (*P. veris*) or Polyanthuses, and Oxlips; and the two forms always presented the same differences, including the same relative difference in the size of the pollen-grains.

Primula Auricula presents the two forms; but amongst the improved fancy kinds the long-styled are rare, as these are less valued by florists, and seldomer distributed. There is a much greater relative inequality in the length of the pistils and stamens than in the Cowslip, the pistil in the long-styled form being nearly four times as long as in the short-styled, in which it is barely longer than the ovarium; the stigma is nearly of the same shape in both forms, but it is rougher in the long-styled, though the difference is not so great as in the two forms of the Cowslip. In the long-styled plants the stamens are very short, rising but little above the ovarium. The pollen-grains of these short stamens from the long-styled plants, when distended with water, were barely $\frac{5}{6000}$ of an inch in diameter, whereas those from the long stamens of the short-styled plants were barely $\frac{7}{6000}$, showing a relative difference of five to seven. The smaller grains of the long-styled plants were much more transparent, and before distention with water more triangular in outline than those of the other form. In one anomalous specimen with a long pistil, the stamens almost surrounded the stigma, so that they occupied the position proper to the stamens of the short-styled form; but the small size of the pollen-grains showed that these stamens had been abnormally developed in length, and that the anthers ought to have stood at the base of the corolla.

In the two forms of *Primula Sinensis*, the pistil is about twice as long in the one as in the other. The stigma of the long-styled varies much in shape, but is considerably more elongated and rougher than that of the short-styled, the latter being nearly smooth and spherical, but depressed on the summit. The shape of the throat of the corolla in the two forms differs as in the Cowslip, as does the length of the stamens. But it is remarkable that the pollen-grains of both forms, wet and dry, presented no difference in diameter; they vary somewhat in size, as do the pollen-grains of all the species, but in both forms the average diameter was rather above $\frac{10}{6000}$ of an inch. There is one remarkable difference in the two forms of this species, namely (as we shall presently more fully see), that the short-styled plants, if insects be excluded and there be no artificial fertilization, are quite sterile, whereas the long-styled produce a moderate quantity of seed. But when both forms are properly fertilized, the short-styled flowers (as with Cowslips) yield more seed than the long-styled. In a lot of seedlings which I raised, there were thirteen long-styled and seven short-styled plants.

Of *Primula ciliata* a long-styled specimen, and of *P. ciliata*, var. *purpurata*, a short-styled specimen, were sent me from Kew by Prof. Oliver. This case, however, is hardly worth giving, as the variety *purpurata* is said* to be a hybrid between this species and *P. auricula*; and the height of the stamens in the one form does not correspond with the height of the stigma in the other, as they would have done had they been the same species. There was, however, the usual difference in the roughness of the stigmas in the two forms, and the pollen-grains, distended in water, measured $\frac{6}{6000}$ and $\frac{4-5}{6000}$ of an inch in diameter. Single trusses were sent me of *P. denticulata* and *P. Piedmontana* which were long-styled, and of *P. marginata* and *nivalis* which were short-styled; and the general character of the organs leaves hardly any doubt on my mind that these species are dimorphic. In a single flower of *P. Sibirica*, however, which was sent me from Kew, the stigma reached up to the base of the anthers; so that this species is not dimorphic, or not dimorphic as far as the length of the pistil and stamens are concerned, unless indeed this single specimen was anomalous, like that mentioned of *P. auricula*.

We thus see that the existence of two forms is very general, if not universal, in the genus *Primula*. The simple fact of the pollen-grains differing in size and outline, and the stigma, in shape and roughness, in two sets of individuals of the same species, is curious. But what, it may be asked, is the meaning of these several differences? The question seems worthy of careful investigation, for, as far as I know, the use or meaning of dimorphism in plants has never been explained; hence, I will give my observations in detail, though I am far from supposing that all cases of dimorphism are alike. The first idea which naturally occurred was, that the species were tending towards a dioicous condition; that the long-styled plants, with their rougher stigmas, were more feminine in nature, and would produce more seed; that the short-styled plants, with their long stamens and larger pollen-grains, were more masculine in nature. Accordingly, in 1860, I marked some Cowslips of both forms growing in my garden, and others growing in an open field, and others in a shady wood, and gathered and weighed the seed. In each of these little lots the short-styled plants yielded, contrary to my expectation, most seed. Taking the lots together, the following is the result:—

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* Sweet's 'Flower Garden,' vol. v. tab. 123.

	No. of Plants.	No. of Umbels produced.	No. of Capsules produced.	Weight of seed in grains.
Short-styled Cowslips	9	33	199	83
Long-styled Cowslips	13	51	261	91

If we reduce these elements for comparison to similar terms, we have—

	No. of Plants.	Weight of seed in grains.	No. of Umbels.	Weight of seed.	No. of Capsules.	Weight of seed in grains.
Short-styled Cowslips	10	92	100	251	100	41
Long-styled Cowslips	10	70	100	178	100	34

So that, by all the standards of comparison, the short-styled are the most fertile; if we take the number of umbels (which is the fairest standard, for large and small plants are thus equalized), the short-styled plants produce more seed than the long-styled, in the proportion of four to three.

In 1861 I tried the result in a fuller and fairer manner. I transplanted in the previous autumn a number of wild plants into a large bed in my garden, treating them all alike; the result was—

	No. of Plants.	No. of Umbels.	Weight of seed in grains.
Short-styled Cowslips ...	47	173	745
Long-styled Cowslips ...	58	208	692

These figures, reduced as before, give the following proportions:—

	Number of Plants.	Weight of seed in grains.	Number of Umbels.	Weight of seed in grains.
Short-styled Cowslips ...	100	1585	100	430
Long-styled Cowslips ...	100	1093	100	332

The season was much better this year than the last, and the plants grew in good soil, instead of in a shady wood or struggling with other plants in the open field; consequently the actual produce of seed was considerably greater. Nevertheless we have the same relative result; for the short-styled plants produced more seed than the long-styled in the proportion of three to two; but if we take the fairest standard of comparison, namely, the number of umbels, the excess is, as in the former case, as four to three.

I marked also some Primroses, all growing together under the same conditions; and we here see the product:—

	No. of Plants.	Total No. of Capsules.	Good Capsules.	Weight of seed in grains.	Or by Calculation:	Good Capsules.	Weight of seed.
Short-styled Primroses	8	49	40	16		100	40
Long-styled Primroses	9	68	50	10		100	20

The number of Primrose plants tried was hardly sufficient, and the season was bad; but we here again see (excluding the capsules which contained no seed) the same result in a still more marked manner, for the short-styled plants were twice as productive of seed as the long-styled plants.

I had, of course, no means of ascertaining the relative fertility of the two forms of the Chinese Primrose in a natural condition, and the result of artificial fertilization can hardly be trusted; but sixteen capsules from long-styled flowers, properly fertilized, produce 9·3 grains' weight of seed, whereas eight capsules of short-styled flowers produced 6·1 grains; so that if the same number, namely, 16 of the latter, had been fertilized, the weight of seed would have been 12·2, which would have been nearly in the proportion of four to three, as in Cowslips.

Looking to the trials made during two successive years on the large number of Cowslips, and on these facts with regard to common Primroses and Chinese Primroses, we may safely conclude that the short-styled forms in these species are more productive than the long-styled forms; consequently the anticipation that the plants having largely developed pistils with rougher stigmas, and having shorter stamens with smaller pollen-grains, would prove to be more feminine in their nature is exactly the reverse of the truth. If the species of *Primula* are tending to become dioicous, which possibly may be the case, the future hypothetical females would have short pistils, and the males would have short stamens; but this tendency is accompanied, as we shall presently see, by other conditions of the generative system of a much more singular nature. Anyhow, the possibility of a plant thus becoming dioicous by slow degrees is worthy of notice, as the fact would so easily escape observation.

In 1860 I found that a few umbels of both long-styled and short-styled Cowslips, which were covered by a net, did not produce seed, though other umbels on the same plants, artificially fertilized, produced an abundance of seed; and this fact shows that the mere covering in itself was not injurious. Accordingly, in 1861 I covered up under a similar net several plants just before they opened their flowers; these turned out as follows:—

	No. of Plants.	No. of Umbels produced,	Product of Seed.
Short-styled	6	24	1·3 grains, or 50 seeds.
Long-styled	18	74	Not one seed.

Judging from the exposed plants which grew all round in the same bed, and had been treated in every way exactly the same, except that they were exposed to the visits of insects, the six short-styled plants ought to have produced 92 grains' weight of seed instead of only 1·3; and the eighteen long-styled plants, which produced not one seed, ought to have produced above 200 grains' weight. The production of the 1·3 grain of seed in the smaller lot was probably due to the action of Thrips or some minute insect. This evidence is sufficient, but I may add that ten pots of Polyanthuses and Cowslips of both forms, protected from insects in my greenhouse, did not set one pod, though artificially fertilized flowers in other pots produced an abundance. So we see that the visits of insects are absolutely necessary to the fertilization of Cowslips. As the exposed plants produced an abundance of seed, the tendency to a dioicous condition, previously remarked on, might have been safely carried on, as we see that there is an effective agency already at work which would have carried pollen from one sex to the other.

What insects habitually visit Cowslips, as is absolutely necessary for their regular fertility, I do not know. I have often watched them, but perhaps not long enough; and only four times I have seen Humble-bees visiting them. One of these bees was gathering pollen from short-styled flowers alone, another had bitten holes through the corolla; and neither of these would have been effective in the act of fertilization: two others were sucking long-styled plants. I have watched Primroses more attentively during several years, and have never seen an insect visit them; yet from their close similarity in all essential respects to Cowslips, there can hardly be a doubt that they require the visits of insects. Hence I am led to suppose that both Primroses and Cowslips are visited by moths. All the species which I have examined secrete plenty of nectar.

In *Primula Sinensis*, when protected from insects and not artificially fertilized, the case is somewhat, but not materially, different. Five short-styled plants produced up to a given period 116 flowers, which set only seven capsules, whereas twelve other flowers on the same plants artificially fertilized set ten capsules. Five long-styled plants produced 147 flowers, and set sixty-two capsules; so that this form, relatively to the other, sets a far greater number of capsules: yet the long-styled protected flowers do not set nearly so well as when artificially fertilized; for out of forty-four flowers thus treated, thirty-eight set. These remarks apply only to the early setting of the capsules, many of which did not continue swelling. With respect to the product of seed, seven protected short-styled plants, which bore about 160 flowers, produced only half a grain of seed; they ought to have produced 120 grains: so that the short-styled plants, when protected from insects, are nearly as sterile as Cowslips. Thirteen long-styled plants, which bore about 380 flowers, and which as we have seen set many more capsules, produced 25·9 grains of seed; they ought to have produced about 220 grains in weight: so that although far less fertile than the artificially fertilized flowers, yet the long-styled *P. Sinensis*, when protected from insects, is nearly twenty-four times as fertile as the short-styled when protected from insects. The cause of this difference is, that when the corolla of the long styled plants falls off, the short stamens near the bottom of the tube are necessarily dragged over the stigma and leave pollen on it, as I saw by hastening the fall of nearly withered flowers; whereas in the short-styled flowers, the stamens are seated at the mouth of the corolla, and in falling off do not brush over the lowly seated stigma. In the Cowslip the corolla does not fall off; and both long-styled and short-styled plants are equally sterile when protected from insects. It is a rather curious case, that the falling of the corolla, or its remaining attached when withered, might have a considerable influence on the numbers of a plant, during a year unfavourable to the visits of the proper insects.

In three short-styled plants of *Primula auricula*, protected from insects, the flowers which I fertilized produced seed, but those which were not touched produced none.

In all the species of *Primula* the pollen readily coheres to any object. In all that I have observed, though the stamens and pistils differ in length relatively to each other in the different species, yet, in the two forms of the same species, the stigma of the one form stands at exactly the same height with respect to the corolla as the anthers of the other form. If the proboscis of a dead Humble-bee, or thick bristle, or rough needle be pushed down the corolla, first of one form, and then of the other, as an insect would do in visiting the two mingled forms, it will be found that pollen from the long-stamened form will adhere round the base of the proboscis, and will be left with certainty on the stigma of the long-styled form; pollen from the short stamens of the long-styled form will also adhere a little above the tip of the proboscis, and some will generally be left on the stigma of the other form. Thus pollen will be carried reciprocally from one form to the other. In withdrawing the proboscis from the long-styled form, with pollen adhering near the tip, there will be a good chance of some being left on the flower's own stigma, in which case there will be self-fertilization; but this by no means always occurs. In the short-styled form, on the other hand (and it is important to remember this), in inserting the proboscis between the anthers situated at the mouth of the corolla, pollen, as I repeatedly found, is almost invariably carried down and left on the flower's own stigma. Moreover minute insects, such as Thrips, numbers of which I have observed in Primrose flowers thickly dusted with pollen, could not fail often to cause self-fertilization. We positively know that the visits of large insects are necessary to the fertilization of the species of *Primula*; and we may infer from the facts just given that these visits would carry pollen reciprocally from one form to the other, and would likewise *tend* to cause self-fertilization, more especially in the short-styled (*i. e.* long-stamened) form.

These observations led me to test the potency of the two pollens with respect to the two stigmas in *P. veris, Sinensis,* and *auricula.* In each species four crosses can be tried; namely, the stigma of the long-styled by its own-form pollen and by that of the short-styled, and the stigma of the short-styled by its own-form pollen and by that of the other form. It is necessary to use and remember two new terms for these crosses: when the long- and the short-styled stigmas are fertilized by their own-form pollen the union is said to be "homomorphic;" when the long-styled and short-styled stigmas are fertilized by the pollen of the other form, the union is "heteromorphic." I speak of the "own-form pollen," because in the following homomorphic unions, in order to make the experiment perfectly fair, I never placed the pollen of the same flower on its own stigma, but, to avoid the possible ill effects of close interbreeding, I always used the pollen from another plant of the same form. In the following experiments all the plants were treated in exactly the same manner, and were carefully protected from insects as far as that is possible. I performed every manipulation myself, and weighed the seed in a chemical balance. Some of the capsules contained no seed, or only two or three, and these are excluded in the column marked "good pods." First for *P. Sinensis,* as the simplest case.

Primula Sinensis.—TABLE I.

	Number of flowers fertilized.	Total number of pods produced.	Number of good pods.	Weight of seed in grains.	By Calculation. Good Pods. { Weight of seed in grains.
Long-styled by own-form pollen (homomorphic union)	20	18	13	5·9	or as 100 to 45
Long-styled by pollen of short-styled (heteromorphic union)...	24	18	16	9·3	or as 100 to 58
Short-styled by own-form pollen (homomorphic union)	7	5	4	0·9	or as 100 to 22
Short-styled by pollen of long-styled (heteromorphic union)...	8	8	8	6·1	or as 100 to 76
Summary :					
The two homomorphic unions	27	23	17	6·8	
The two heteromorphic unions	32	26	24	15·4	

For the sake of comparison, we may reduce these latter figures as follows:—

	Number of flowers fertilized.	Number of good pods.	Weight of seed in grains.	Number of good pods.	Weight of seed in grains.
The two homomorphic unions	100	63	25	100	40
The two heteromorphic unions	100	75	48	100	64

In the first part of the upper table, the number of flowers fertilized and the simple result is shown; and at the right hand, for the sake of comparison, the calculated product of the weight of seed from 100 good pods of each of the four unions is given; showing that in each case the heteromorphic union is more fertile than the homomorphic union. Beneath we have a simple summary of the two homomorphic and the two heteromorphic unions. And lastly, for the sake of comparison, a calculation has been made from this summary; first, assuming that 100 flowers of both kinds of unions were fertilized; and then to the right hand, assuming that 100 good pods were produced from both unions. If we compare the result, we see that the flowers of the two heteromorphic unions produced a greater number of good pods, and a greater weight of seed, than the flowers of the two homomorphic unions; and again (and this is the fairest element of comparison, for accidents are thus almost eliminated), that the good pods from the two heteromorphic unions yielded more seed, in about the proportion of three to two, than those from the two homomorphic unions. The difference in weight from 100 capsules of the two forms is 24 grains, and this is equal to at least 1200 seeds.

Beneath we have Table II. of *P. veris*, or the Cowslip. The upper part is exactly the same as in the Table of *P. Sinensis*, and we see in each case that the heteromorphic is more fertile than the homomorphic union. The calculated results from the summary of the two homomorphic and the two heteromorphic unions are more complex than with the last species, as I wished to show that, however we proceed, the general result is the same. We see that the assumed hundred flowers, heteromorphically fertilized by the pollen of the other forms, yielded more capsules, more good capsules, and a greater weight of seed; but I rely little on this, as some whole umbels perished after being fertilized. The fairest element of comparison is to take the good capsules alone; and we here see that the 100 from the two heteromorphic unions yielded seed which in weight was as 54 to 35 from the 100 good capsules of the two homomorphic unions,—that is, nearly as three to two, as in the Chinese Primrose.

Primula veris.—TABLE II.

	Number of flowers fertilized.	Total number of pods produced.	Number of good pods.	Weight of seed in grains.	By Calculation.	
					Good Pods.	Weight of seed in grains.
Long-styled by own-form pollen (homomorphic union)	20	8	5	2·1	or as 100 to 42	
Long-styled by pollen of short-styled (heteromorphic union)...	22	15	14	8·8	or as 100 to 62	
Short-styled by own-form pollen (homomorphic union)	15	8	6	1·8	or as 100 to 30	
Short-styled by pollen of long-styled (heteromorphic union)...	13	12	11	4·9	or as 100 to 44	
Summary :						
The two homomorphic unions	35	16	11	3·9		
The two heteromorphic unions	35	27	25	13·7		

For the sake of comparison, we may reduce these figures as follows:—

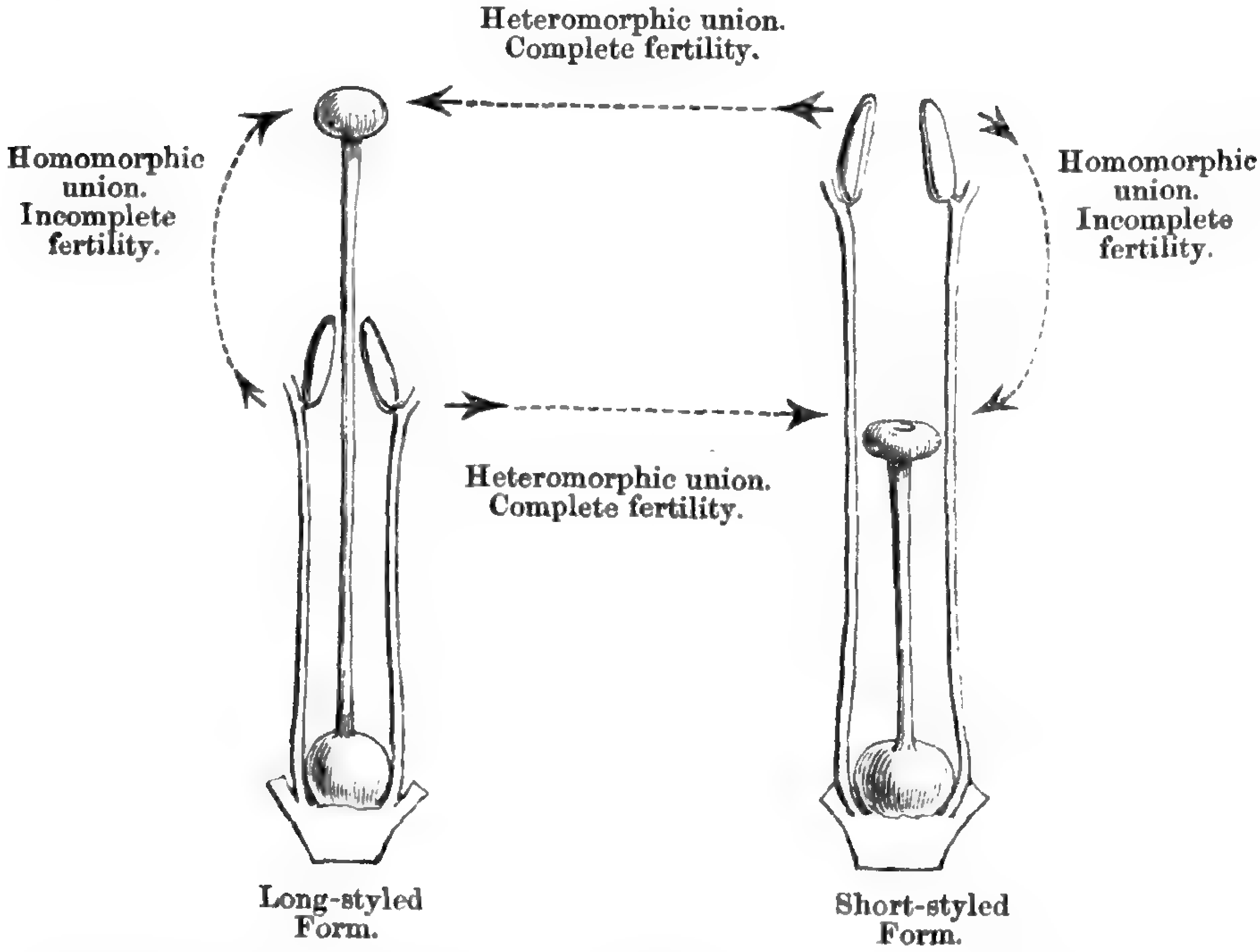
	Number of flowers fertilized.	Total number of pods produced.	Number of good pods.	Weight of seed in grains.	Total number of pods produced.	Weight of seed in grains.	Number of good pods.	Weight of seed in grains.
The two homomorphic unions	100	45	31	11	100	24	100	35
The two heteromorphic unions	100	77	71	39	100	50	100	54

With *P. auricula* I was unfortunate; my few seedlings, except one poor plant, all came up short-styled; and of these plants several died or became sick, owing to the hot weather and the difficulty of excluding insects and ventilating the corner of my greenhouse enclosed with net. I finally got only two pods from one union, and three from the other. The result is given in the following table; and, though worth little, we here again see that the heteromorphic are far more fertile than the homomorphic unions.

Primula auricula.—TABLE III.

	Total number of pods produced.	Number of good pods.	Weight of seed in grains.	Good Pods. } Weight of seed in grains.
Short-styled by own-form pollen (homomorphic union) ..	2	1	0·12	or as 100 to 12
Short-styled by pollen of long-styled (heteromorphic union)	3	3	1·50	or as 100 to 50

Whoever will study these three tables, which give the result of 134 flowers carefully fertilized and protected, will, I think, be convinced that in these three species of *Primula* the so-called heteromorphic unions are more fertile than the homomorphic unions. For the sake of clearness, the general result is given in the following diagram, in which the dotted lines with arrows represent how in the four unions pollen has been applied.


Heteromorphic union.
Complete fertility.
Homomorphic union.
Incomplete fertility.
Homomorphic union.
Incomplete fertility.
Heteromorphic union.
Complete fertility.
Long-styled Form.
Short-styled Form.

We here have a case new, as far as I know, in the animal and vegetable kingdoms. We see the species of *Primula* divided into two sets or bodies, which cannot be called distinct sexes, for both are hermaphrodites; yet they are to a certain extent sexually distinct, for they require for perfect fertility reciprocal union. They might perhaps be called sub-dioicous hermaphrodites. As quadrupeds are divided into two nearly equal bodies of different sexes, so here we have two bodies, approximately equal in number, differing in their sexual powers and related to each other like males and females. There are many hermaphrodite animals which cannot fertilize themselves, but must unite with another hermaphrodite: so it is with numerous plants; for the pollen is often mature and shed, or is mechanically protruded, before the flower's own stigma is ready; so that these hermaphrodite flowers absolutely require for their sexual union the presence of another hermaphrodite. But in *Primula* there is this wide difference, that one individual Cowslip, for instance, though it can with mechanical aid imperfectly fertilize itself, for full fertility must unite with another individual; but it cannot unite with any individual in the same manner as an hermaphrodite Snail or Earth-worm can unite with any other one Snail or Earth-worm; but one form of the Cowslip, to be perfectly fertile, must unite with one of the other form, just as a male quadruped must and can unite only with a female.

I have spoken of the heteromorphic union in *Primula* as resulting in full fertility; and I am fully justified, for the Cowslips thus fertilized actually gave rather more seed than the truly wild plants —a result which may be attributed to their good treatment and having grown separately. With respect to the lessened fertility of the homomorphic unions, we shall appreciate its degree best by the following facts. Gärtner has estimated the degree of sterility of the union of several distinct species*, in a manner which allows of the strictest comparison with the result of the heteromorphic and homomorphic unions of *Primula*. With *P. veris*, for every hundred seeds yielded by the heteromorphic unions, only sixty-four seeds were yielded by an equal number of good capsules from the homomorphic unions. With *P. Sinensis* the proportion was nearly the same—namely, as 100 to 62. Now Gärtner has shown that, on the calculation of *Verbascum lychnitis* yielding with its own pollen 100 seeds, it yields when fertilized by the pollen of *V. Phœniceum* ninety seeds; by the pollen of *V. nigrum*, sixty-three seeds; by that of *V. blattaria*, sixty-two seeds. So again, *Dianthus barbatus* fertilized by the pollen of *D. superbus* yielded eighty-one seeds, and by the pollen of *D. Japonicus* sixty-six seeds, relatively to the 100 seeds produced by its own pollen. Thus we see—and the fact is highly remarkable—that the homomorphic unions relatively to the heteromorphic unions in *Primula* are more sterile than the crosses between several distinct species relatively to the pure union of those species.

The meaning or use of the existence in *Primula* of the two forms in about equal numbers, with their pollen adapted for reciprocal union, is tolerably plain; namely, to favour the intercrossing of distinct individuals. With plants there are innumerable contrivances for this end; and no one will understand the final cause of the structure of many flowers without attending to this point. I have already shown that the relative heights of the anthers and stigmas in the two forms lead to insects leaving the pollen of the one form on the stigma of the other; but, at the same time, there will be a strong probability of the flower's own pollen being likewise placed on the stigma. It is perfectly well known that if the pollen of several closely allied species be placed on the stigma of a distinct species, and at the same time, or even subsequently, its own pollen be placed on the stigma, this will entirely destroy the simultaneous or previous action of the foreign pollen. So again if the pollen of several varieties, including the plant's own pollen, be placed on the stigma, one or more of the varieties will take the lead and obliterate the effect of the others: but I have not space here to give the facts on which this conclusion is grounded. Hence we may infer as highly probable that, in *Primula,* the heteromorphic pollen which we know to be so much the most effective would obliterate the action of the homomorphic pollen when left on the flower's own stigma by insects; and thus we see how potent the dimorphic condition of the pollen in *Primula* will be in favouring the intercrossing of distinct individuals. The two forms, though both sexes are present in each, are in fact dioicous or unisexual. Whatever advantage there may be in the separation of the sexes, towards which we see so frequent a tendency throughout nature, this advantage has been here so far gained, that the one form is fertilized by the other, and conversely; and this is effected by the pollen of each form having less potency than that of the other on its own stigma.

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* Versuche über die Bastarderzeugung, 1849, s. 216.

Bearing on this view of the final cause of the dimorphism of the *Primulas,* there is another curious point. If we look at the right-hand figures of the four first lines in the previous tables of *P. Sinensis* and *veris,* we shall see that one of the homomorphic unions, namely, the short-styled by its own-form pollen, is considerably more sterile than the other; and in *P. auricula,* though here there is no other homomorphic union as a standard of comparison, this union is likewise excessively sterile. That the fertility of this union is really less in a marked degree than in the other three unions, we have an independent proof in the seeds germinating less perfectly and much more slowly than those from the other unions.

This fact is the more remarkable, because we have clearly seen that the short-styled form in the Cowslip in a state of nature is the most productive of seed. This form bears its anthers close together at the mouth of the corolla, and I observed long before I had ascertained the relative fertility of the four unions, in passing the proboscis of a dead Humble-bee or bristle down the the corolla, that in this form the flower's own pollen was almost certain to be left on its own stigma; and, as I wrote down at the time, the chance of self-fertilization is much stronger in this than in the other form. On this view we can at once understand the good of the pollen of the short-styled form, relatively to its own stigma, being the most sterile; for this sterility would be the most requisite to check self-fertilization, or to favour intercrossing. Hence, also, it would appear that there are four grades of fertility from the four possible unions in *Primula*; of the two homomorphic unions, as we have just seen, one is considerably more sterile than the other. In the wild state we know that the short-styled plants are more fertile than the long-styled; and we may infer as almost certain, that in the wild state, when the flowers are visited by insects, as is absolutely necessary for the production of seed, and when pollen is freely carried from one form to the other, that the unions are heteromorphic; if so, there are two degrees of fertility in the heteromorphic unions, making altogether four grades of fertility.

Two or three other points deserve a passing notice. The question whether the Primrose and Cowslip (*P. vulgaris* and *veris*) are distinct species or varieties has been more disputed and experimented on than in any other plant. But as we now know that the visits of insects are indispensable to the fertilization of these plants, and that in all probability the heteromorphic pollen of a Primrose would be prepotent on the stigma of a Cowslip over the homomorphic pollen of a Cowslip, the numerous experiments which have been made, showing that Oxlips appear amongst the seedlings of Cowslips, cannot be trusted, as the parent plants do not appear to have been carefully protected from insects*. I am far from wishing to affirm that pure Cowslips will not produce Oxlips, but further experiments are absolutely necessary. We may also suspect that the fact noticed by florists*, that the varieties of the Polyanthus never come true from seed, may be *in part* due to their habitually crossing with other varieties of the Polyanthus.

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* Mr. Sidebotham (Phytologist, vol. iii. pp. 703–5) states that he protected his plants from crossing; but as he gives in detail all the precautions which he took, and says nothing about artificial fertilization, we may conclude that he did not fertilize his plants. As he raised very numerous seedlings, he would have had to fertilize many flowers, if they had been really well guarded against the visits of insects. Hence I conclude that his results are not worthy of trust.

The simple fact of two individuals of the same undoubted species, when homomorphically united, being as sterile as are many distinct species when crossed, will surprise those who look at sterility as a special endowment to keep created species distinct. Hybridizers have shown† that individual plants of the same species vary in their sexual powers, so far that one individual will unite more readily than another individual of the same species with a distinct species. Seeing that we thus have a groundwork of variability in sexual power, and seeing that sterility of a peculiar kind has been acquired by the species of *Primula* to favour intercrossing, those who believe in the slow modification of specific forms will naturally ask themselves whether sterility may not have been slowly acquired for a distinct object, namely, to prevent two forms, whilst being fitted for distinct lines of life, becoming blended by marriage, and thus less well adapted for their new habits of life. But many great difficulties would remain, even if this view could be maintained.

Whether or not the dimorphic condition of the *Primulæ* has any bearing on other points in natural history, it is valuable as showing how nature strives, if I may so express myself, to favour the sexual union of distinct individuals of the same species. The resources of nature are illimitable; and we know not why the species of *Primula* should have acquired this novel and curious aid for checking continued self-fertilization through the division of the individuals into two bodies of hermaphrodites with different sexual powers, instead of by the more common method of the separation of the sexes, or by the maturity of the male and female elements at different periods, or by other such contrivances. Nor do we know why nature should thus strive after the intercrossing of distinct individuals. We do not even in the least know the final cause of sexuality; why new beings should be produced by the union of the two sexual elements, instead of by a process of parthenogenesis. When we look to the state in which young mammals and birds are born, we can at least see that the object gained is not, as has sometimes been maintained, mere dissemination. The whole subject is as yet hidden in darkness.

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* Mr. D. Beaton, in 'Journal of Horticulture,' May 28, 1861, pp. 154, 244.

† Gärtner, Bastarderzeugung, s. 165.

I will now only add that cases of dimorphism, like that of *Primula*, seem to be far from rare in the vegetable kingdom, though they have been little attended to. A large and important class of analogous facts will probably soon be discovered. Professor Asa Gray* informs me, that he and Dr. Torrey have described several Rubiaceous genera, in which some plants have exserted stamens, and others exserted pistils. "Mitchella offers an interesting instance of this structure from its relationship, through *Nertera*, to *Coprosma*, one of the few diœcious genera of *Rubiaceæ*, and in which the stamens are elongated in the male flowers and the styles in the females." The long-styled hermaphrodite flowers of Mitchella would probably be found more productive of seed than the short-styled; in the same way, but in a reversed manner, as in *Primula*, the short-styled flowers are more productive than the long-styled; from which fact I inferred that, if *Primula* were to become diœcious, the females would have short pistils and the males short stamens, these being the corresponding organs necessary for a heteromorphic union with full fertility. In the diœcious *Coprosma*, on the other hand, the females have long pistils, and the males have long stamens. These facts probably show us the stages by which a diœcious condition has been acquired by many plants.

Prof. A. Gray also informs me that another Rubiaceous genus (*Knoxia*) in India has been described by Dr. Wight, with a similar structure; and this, I am told, is the case with *Cinchona*. Several species of North American *Plantago* are dimorphic, as is *Rhamnus lanceolatus*, as far as its female organs are concerned. In the *Boragineæ*, Dr. Torrey has observed a strongly marked instance in *Amsinckia spectabilis*: in some dried flowers sent me by Prof. Gray, I find that the pistil in the one form is more than twice as long as in the other, with a corresponding difference in the length of the stamens; in the short-styled flowers the grains of pollen, as in *Primula*, apparently are larger, in the proportion of nine to seven, than in the long-styled flowers, which have the short stamens; but the difference can hardly be determined with safety in dried flowers. In *Mertensia alpina*, another member of the *Boragineæ*, Prof. Gray finds a new and inexplicable case,—namely, some specimens with the stamens and pistil sub-exserted, and other specimens with *both* organs seated low down the tube of the corolla. Dr. Torrey and Prof. Gray have designated all such plants as "diœciously dimorphous." In the *Labiatæ*, Mr. Bentham informs me that several species of *Ægiphyla*, and some of *Mentha*, are dimorphic like *Primula*. The case of *Thymus* is different, as I know from my own observations; but I will not here enlarge on this genus. Again, as I hear from Mr. Bentham, numerous species of *Oxalis* are similarly dimorphic. I can add the genus *Linum*. So that we already know of species (generally several in the same genus) having distinct dimorphic individuals, as far as structure is concerned, however it may prove in function, in no less than eight natural orders.

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* See also Prof. Asa Gray's 'Manual of the Botany of the N. United States,' 1856, p. 171. For *Plantago*, see p. 269.

With respect to *Linum*, I will not here enter on details, as I intend to try further experiments next summer; but I may state, that I observed many years ago two forms in *Linum flavum*, with both the pistils and stamens differing in length. In *Linum grandiflorum* there are likewise two forms which present no difference in their male organs, but the pistil and stigmatic surfaces are much longer in the one form than in the other. The short-styled form, I have good reason to believe, is highly fertile with its own pollen; whether it be more fertile with the pollen of the long-styled form, I cannot at present say. The long-styled form, on the other hand, is quite sterile with its own pollen: several plants grew in my garden, remote from the short-styled plants; their stigmas were coloured blue with their own pollen; but although they produced a vast number of flowers, they did not produce a single seed-capsule. It seemed a hopeless experiment; but I had so much confidence from my trials on *Primula*, that I put a little pollen from the short-styled plants on the stigmas (already blue with their own pollen) of twelve flowers on two of the long-styled plants. From these twelve flowers I got eight remarkably fine seed-capsules; the other flowers not producing a single capsule. The existence of plants in full health, and capable of bearing seed, on which their own pollen produces no more effect than the pollen of a plant of a different order, or than so much inorganic dust, is one of the most surprising facts which I have ever observed.

Notes on *Malvaceæ* and *Sterculiaceæ*. By George Bentham, Esq., P.L.S.

[Read June 20, 1861.]

Botanists appear to be unanimous in bringing together the group of orders designated by Endlicher under the name of *Columniferæ*, by Brongniart under that of *Malvoideæ*, and included by Lindley in his alliance of *Malvales*. They are characterized generally by the valvate calyx, contorted petals, monadelphous or indefinite stamens, and syncarpous ovary; and as to habit, by alternate stipulate leaves often toothed or palmately lobed, and a great tendency to stellate pubescence. The subdivision of the group, however, has been the object of much diversity of opinion. Whilst A. de St. Hilaire proposed the adoption of two orders only, Malvaceæ and Tiliaceæ, the greater number of modern botanists have admitted one or two intermediate ones, Sterculiaceæ and Buettneriaceæ; whilst others enumerate as many as nine distinct orders, Malvaceæ, Bombaceæ, Sterculiaceæ, Lasiopetaleæ, Buettneriaceæ, Hermanniaceæ, Dombeyaceæ, Tiliaceæ, and Elæocarpeæ. The Tiliaceæ, including Elæocarpeæ, characterized by indefinite free or nearly free stamens with 2-celled anthers, have been the subject of a previous paper (Linn. Journ. v. 2nd Suppl.). I have now to offer a few observations on the Malvaceæ as understood by St. Hilaire, characterized by monadelphous stamens, or, in the very few cases where they are free, definite and alternate with the sepals.

There is so much intercommunity, both in habit and character, in the various orders or tribes of this group, that the proposal for their union, although not generally adopted, was perhaps the most in conformity to the general principles of the natural method; yet there is one character, derived from the one- or two-celled anthers, which seems to divide them into two large groups, Malvaceæ and Sterculiaceæ, accurately limited (with the exception of a very few species, whose affinities are, by other characters, placed beyond doubt) and not unnatural; and this classification we propose to adopt, in common with the majority of modern botanists, although not with the usual limits. For Bombaceæ, usually classed as a tribe of Sterculiaceæ, have the one-celled anthers of Malvaceæ; and, in their accessory characters, their soft wood, their staminal arrangement, the cotton within the capsule of so many of them, show a nearer connexion with some of the arborescent Hibisceæ than with any true Sterculiaceous genera. It is true that the smooth pollen-grains have been adduced as a positive character connecting them rather with Sterculiaceæ than with Malvaceæ, but its constancy is very far from being proved. The pollen has only been described in a very few genera. As far as my observation goes, it is always tuberculate or muricate in what are considered as true Malvaceæ; but so I have found it also in *Hampea*, in several Helicteroid genera, &c.; so that, in the present state of our knowledge, the pollen cannot be taken as furnishing an ordinal character.

Although the one-celled anthers are thus taken by common consent as the essential characters of Malvaceæ, on account of its remarkable constancy in genera otherwise related, yet it is of very little organic importance. It is not occasioned by the constant abortion of one cell, but by the two cells, placed end to end as in many distinctly two-celled genera, but confluent from a very early period. In many genera no trace of any transverse partition or even contraction can, I believe, be traced at any age; in others, in the young bud, there is a distinct contraction in the middle of the anther, showing its normal structure. *Helicteres*, which on many accounts belongs undoubtedly to Sterculiaceæ, shows, in regard to the anthers, the passage from the Malvaceous confluent anthers of *H. pentandra*, &c., to the Sterculiaceous distinctly two-celled ones of *H. angustifolia*, &c.; but here the contraction in the young anthers may, I believe, be found in all the species.

MALVACEÆ have been distributed into tribes, and the genera circumscribed with so much tact and ability by A. Gray, that I have little to propose in modification of his arrangement, except the addition of one or two genera which had not come under his observation, and the annexation of Bombaceæ,—in consequence of which I should propose reducing some of his tribes to the rank of subtribes, as will appear in the following enumeration of tribes and genera.

Tribus I. MALVEÆ. Columna staminea apice v. usque ad apicem antherifera. Styli rami tot quot ovarii loculi v. carpella. Carpella matura ab axi v. receptaculo secedentia (exceptis *Bastardia* et *Howittia*).

Subtribus 1. MALOPEÆ. Carpella inordinate congesta. Ovula solitaria, adscendentia.

* *Styli rami longitudinaliter stigmatosi.*

Genus :—1. Malope, *Linn.*

*** Styli rami apice stigmatosi.*

Genera :—2. Kitaibelia, *Willd.*; 3. Palava, *Cav.*

Subtribus 2. Eumalveæ. Carpella simplici serie verticillata. Ovula solitaria, adscendentia.

** Styli rami intus longitudinaliter stigmatosi.*

Genera :—4. Althæa, *Cav.*; 5. Lavatera, *Linn.* (*Stegia*, Mœnch; *Saviniona*, Webb; *Navæa*, Webb); 6. Malva, *Linn.* (ex parte); 7. Callirhoe, *Nutt.*; 8. Sidalcea, *A. Gray*; 9. Napæa, *Linn.*

*** Styli rami apice stigmatosi.*

Genus :—10. Malvastrum, *A. Gray.*

Subtribus 3. Sideæ. Carpella simplici serie verticillata. Ovula solitaria, pendula.

** Styli rami intus longitudinaliter stigmatosi.*

Genus :—11. Plagianthus, *Forst.* (*Philippodendron*, Poit.; *Asterotrichon*, Klotzsch; *Blepharanthemum*, Klotzsch; *Lawrencia*, Hook.; *Wrenciala*, A. Gray.

*** Styli rami apice stigmatosi.*

Genera :—12. Hoheria, *A. Cunn.*; 13. Anoda, *Cav.*; 14. Cristaria, *Cav.*; 15. Gaya, *H. B. & K.*; 16. Sida, *Linn.* (ex parte) (*Dictyocarpus*, Wight; *Fleischeria*, Steud.); 17. Bastardia, *H. B. & K.*

Subtribus 4. Abutileæ. Carpella simplici serie verticillata. Ovula 2–∞ (excepta *Wissadula divergente*), sæpius adscendentia, nunc alia pendula, alia adscendentia.

Genera :—18. Howittia, *F. Müll.*; 19. Kydia, *Roxb.*; 20. Wissadula, *Medik.*; 21. Abutilon, *Gærtn.* (*Beloere*, Shuttlew.; *Bastardiæ* sect. *Gayoides*, Endl.); 22. Sphæralcea, *A. de St. Hil.* (*Sphæroma*, Harv.; *Meliphlœa*, Zucc.); 23. Modiola, *Mœnch.*

Tribus II. Ureneæ. Columna staminea extus antherifera, apice truncata v. 5-dentata. Styli rami numero carpellorum dupli. Carpella 5, matura ab axi v. receptaculo secedentia.

Genera :—24. Malachra, *Linn.*; 25. Urena, *Linn.*; 26. Pavonia, *Cav.* (*Lebretonia*, Schranck; *Greevesia*, F. Müll.; *Lopimia*, Nees et Mart.; *Asterochlæna*, Garcke); 27. Goethea, *Nees & Mart.*; 28. Malvaviscus, *Dillen.* (*Achania*, Sw.).

Tribus III. Hibisceæ. Columna staminea extus antherifera, apice truncata v. 5-dentata, v. rarissime antherifera. Stylus in ramos tot quot ovarii loculi divisus v. subinteger. Capsula loculicide dehiscens, carpellis non secedentibus.

Genera :—29. Kosteletzkya, *Presl*; 30. Decaschistia, *W. & Arn.*;

31. Julostyles, *Thw.*; 32. Senra, *Cav.*; 33. Hibiscus, *Linn.* (*Bombycodendron*, Zoll.; *Lagunæa*, Cav.; *Abelmoschus*, Medik.; *Paritium*, A. de St. Hil.); 34. Thespesia, *Corr.*; 35. Fugosia, *Juss.* (*Redoutea*, Vent.); 36. Thurberia, *A. Gray*; 37. Gossypium, *Linn.* (*Sturtia*, R. Br.); 38. Lagunaria, *Don.*

Tribus IV. (v. Subordo) BOMBACEÆ. Columna staminea plus minus divisa in filamenta v. ramos 5–∞, singula 2–8-antherifera, v. rarius subintegra. Stylus integer v. in ramos tot quot ovarii loculos divisus. Capsula loculicide dehiscens v. indehiscens, carpellis non v. vix rarissime secedentibus.

Subtribus 1. ADANSONIEÆ. Folia digitata. Bracteolæ distinctæ v. 0.

* *Columna staminea superne in filamenta numerosa soluta.*

Genera:—39. Adansonia, *Linn.*; 40. Pachira, *Aubl.* (*Carolinea*, Linn. fil.); 41. Bombax, *Linn.* (*Eriotheca*, Schott; *Salmalia*, Schott).

** *Columna staminea 5-fida v. 5-dentata, ramis 2–3-antheriferis.*

Genera:—42. Eriodendron, *DC.* (*Erione*, *Campylanthera*, et *Gossampinus*, Schott); 43. Chorisia, *H. B. & K.*

Subtribus 2. MATISIEÆ. Folia simplicia palmatinervia v. saltem basi 3-nervia. Bracteolæ distinctæ v. 0.

* *Petala 5. Filamenta 1-antherifera, 5–10-adelpha v. libera.*

Genera:—44. Hampea, *Schlecht.*; 45. Scleronema, *Benth.*; 46. Cavanillesia, *Ruiz & Pav.* (*Pourretia*, Willd., non R. & P.).

** *Petala 5. Antheræ secus columnam v. ejus ramos adnatæ.*

Genera:—47. Matisia, *Humb. & Bonpl.*; 48. Quararibea, *Aubl.*; 49. Montezuma, *DC.*; 50. Ochroma, *Sw.*

*** *Petala 0. Antheræ 10, lineares, per paria ramis columnæ adnatæ, antheras 5 biloculares simulantes.*

Genera:—51. Cheirostemon, *Humb. & Bonpl.*; 52. Fremontia, *Torr.*

Subtribus 3. DURIONEÆ. Folia simplicia penninervia integerrima subtus uti inflorescentiæ lepidota. Involucrum calycem cingens, demum varie fissum. Fructus muricatus.

Genera:—53. Cullenia, *Wight*; 54. Durio, *Rumph.*; 55. Lahia, *Hassk.*; 56. Boschia, *Korth.* (*Heteropyxis*, Griff.); 57. Neesia, *Blume* (*Cotylephora*, Meisn.).

A detailed monograph of several of the above genera, especially of those which, like *Sida*, *Abutilon*, *Pavonia*, *Hibiscus*, &c., contain numerous widely spread species, is much wanted, but would lead me too far on the present occasion; nor can I stay to investigate or describe many apparently unpublished forms which we possess in our herbaria. There are, however, a few genera on which I should wish to add some observations, or to characterize some of the more remarkable new species.

PALAVA, *Cav.*

The *P. rhombifolia*, Grah., from Lima, is probably the same species as the *P. malvifolia*, Cav., of which the latter author had probably only examined undeveloped flowers, and thus described the petals as of the length of the calyx. *P. moschata*, Cav., is a very distinct species; and the following one, with the habit of a *Cristaria*, appears to have been hitherto overlooked.

P. DISSECTA, sp. n., tomentosa, foliis profunde bipinnatifidis dissectisve, lobis cuneato-oblongis obtusis integris v. 3–5-lobis, pedunculis calycibusque hispidis.

Hab. Peru, *Cuming*, n. 945; near S. Lorenzo, *Maclean*.

MALVA, *Linn.*

This genus, stripped as it has been by A. Gray of its American and South-African species, becomes at once more natural and better characterized. Amongst European ones, the *M. Sherardiana*, Linn., notwithstanding the almost constant presence of two small bracts, must be referred to *Sida*, of which it has the styles and the seeds. *M. Behriana*, Schlecht., Linnæa, xx. p. 633, from Australia, is *Lavatera plebeia*, Br.

PLAGIANTHUS, *Forst.*

Notwithstanding the close proximity of this Australian genus to *Sida*, most of the species have, under various names, been published as Sterculiaceous genera; for the longitudinal partition in the anthers (much more prominent than in the generality of Malvaceæ) has usually suggested the idea of their being really bilocular. In some species also the ovary is reduced to three, two, or even a single carpel, so as, at least in the latter case, to give readily a false idea of its structure; and one such species, very nearly allied to the original one of Forster, has even been considered as the type of a distinct natural order under the name of *Philippodendreæ*, the affinities of which have much puzzled those who only knew the plant from Poiret's figure and description. The true position of the group among Malvaceæ has now, however, been fully shown by Hooker, A. Gray, Garcke, and others, where, with the ovary and seeds of Sideæ, it is distinguished from the other genera of that subtribe by the styles either clavate or acute, stigmatic along their inner edge or surface as in most Malveæ.

Two genera have been generally distinguished—*Plagianthus* and *Lawrencia*; but the characters which separate them appear to be too inconstant and too little in conformity with habit to be considered as more than sectional. The ovary in *Plagianthus* consists usually of only one or two carpels, but sometimes of three; whilst in *Lawrencia*, although usually five, there are occasionally three only. The more or less clavate or attenuate styles vary also from species to species. The 5-angular calyx of *Lawrencia* is more constant, but even that is not always well marked; and in habit the smaller-leaved *Lawrencias* are much nearer to some of the *Plagianthi* than to *L. spicata*. I should therefore propose to include the whole of the following species in *Plagianthus*.

Sect. 1. PLAGIANTHUS. Calyx campanulatus angulis vix prominulis.

* *Styli apice valde dilatati. Carpella vulgo* 1–2, *rarius* 3.

1. **P. betulinus, A. Cunn. Hook. fil. Fl. N. Zel. i. 29.—P. urticinus, A. Cunn.—Philippodendron regium, Poir. in Ann. Sc. Nat. Par. sér. 2. viii. p. 183, t. 3.—New Zealand.**

2. **P. divaricatus, Forst.; Hook. Bot. Mag. t. 3271; Hook. fil. Fl. N. Zel. i. 29.—New Zealand.**

3. **P. sidoides, Hook. Bot. Mag. t. 3396.—Sida discolor, Hook. Journ. Bot. i. 250.—Asterotriche sidoides, Link, Klotzsch et Otto, Ic. Pl. Rar. t. 8.—Plagianthus Lampenii, Lindl. Bot. Reg. 1838, Misc. p. 22. —Tasmania.**

** *Styli apice clavati. Carpella vulgo* 5.

4. **P. pulchellus, A. Gray; Hook. fil. Fl. Tasm. i. 49, excl. var. β.—Sida pulchella, Bonpl., Hook. Bot. Mag. t. 2753.—Tasmania and Victoria.**

The *P. petiolaris*, Backh. MS., from Illawarra, and *Croton urticoides*, A. Cunn. MS., from the margins of Cox's and Macquarie's Rivers, appear to be the same species; but the specimens I have seen have none but male flowers. The *Sida pulchella*, Bonpl., has been described by DeCandolle as having 2-ovulate 2-aristate carpels, which is totally at variance with our plant. I have, however, ascertained (since the present paper was read), by the inspection of Bonpland's original specimens, that the reference is correct.

*** *Styli apice attenuati. Carpella vulgo 5.*

5. *P. tasmanicus.—Sida tasmanica,* Hook. fil. in Hook. Journ. Bot. ii. 412.—*P. pulchellus,* var. *β,* Hook. fil. Fl. Tasm. i. 49.—Tasmania; also Southern Australia, on the rivers Tambo and Buchan, *F. Müller.*

6.? *P.* sp.?—*Sida dictyocarpa,* Ferd. Müll. MS.—*Sida spicata,* Backh. MS., non Cav.—On the Brisbane River, *Fraser, F. Müller*; Kirkton on the Upper Hunter River, *Backhouse.*

The foliage, indumentum, and inflorescence are those of *P. sidoides,* but the flowers are more crowded and sessile. Calyx shorter, broadly campanulate. Carpels usually five, strongly reticulate. A very distinct species; but the specimens are insufficient to assign its exact place.

**** *Styli superne subclavati. Carpella ∞, matura membranacea, valde compressa.*

7. *P. Lyallii,* Hook. fil. MS.—*Hoheria Lyallii,* Hook. fil. Fl. N. Zel. i. 31, t. 11.—N. Zealand.

This plant appears to me to be much better placed in *Plagianthus* than in *Hoheria,* reducing the latter genus to the single *H. populnea,* which has terminal peltate stigmas and remarkably winged carpels.

Sect. 2. LAWRENCIA. Calyx 5-angulatus, sæpe turbinatus. Styli apice attenuati. Carpella 3–5, nonnulla sæpe abortientia.

8. *P. spicatus.—Lawrencia spicata,* Hook. Ic. Pl. t. 261, 262.—Tasmania and Southern and Western Australia, from Port Fairy to Swan River.

9. *P. glomeratus.—Lawrencia glomerata,* Hook. Ic. Pl. t. 417.—Swan River, *Drummond.*

10. *P. squamatus.—Lawrencia squamata,* Nees, Pl. Preiss. i. 242.—Swan River, *Preiss*; *Drummond,* 4th coll. n. 106.

11. *P. microphyllus,* F. Müll. Fragm. Phyt. Austr. i. 29.—Victoria, *F. Müller*; Swan River, *Drummond,* coll. 1845, n. 208, and 4th coll. n. 252.

SIDA, *Linn.*

Dictyocarpus, Wight, has already been restored to this genus; and *Fleischeria,* Steud. (Steetz in Pl. Preiss. ii. 365), consisting of the single *Sida calyxhymenia,* Gay (DC. Prod. i. 462), only differs from other species in the calyx more enlarged, spreading and membranous after flowering—a character which appears to us wholly insufficient to justify the establishing a monotypic genus.

BASTARDIA, *H. B. & K.*, and HOWITTIA, *F. Müll.*

These two genera differ from the whole tribe of Malveæ in their capsule truly loculicidal as in Hibisceæ, without any tendency to the septicidal separation so universal in other Malveæ. Yet the habit and the staminal column are so completely those of *Sida* and its allies, that they are better placed in their vicinity as exceptional genera, than removed to Hibisceæ, with which they have little else in common. *Bastardia* must, of course, be reduced, as proposed by Grisebach and others, to the two original species, *B. viscosa* and *B. bivalvis*, Kunth. The *B. crispa*, St. Hil., and *B. nemoralis*, St. Hil., have several ovules in each carpel, although most frequently only one comes to maturity. They form the section *Gayopsis* of *Abutilon*, a section including *A. asiaticum*, Don, &c., and proposed by Shuttleworth to be raised to the rank of a genus, under the name of *Beloere*.

WISSADULA, *Medik.*

This small genus, closely allied to *Abutilon*, is adopted by A. Gray and others on account of the transverse projection inside each carpel dividing it into two cells, analogous to the inner appendages which form the character separating *Callirhoe* from *Malva*, and *Modiola* from *Sphæralcea*. It should, however, include, as proposed by Planchon, the *Sida divergens*, Benth., notwithstanding the want of any ovule in the upper portion of the carpels, the lower portion containing a single one. Grisebach on this account retains it as a section of *Sida*, under the name of *Wissada*; but, besides the rudimentary transverse dissepiment and the habit, which separate it from *Sida* and bring it under *Wissadula*, the shape of the fruit indicates its connexion with the latter, and not with the former. In all *Sidas* the upper angle is on the inner edge next the axis, so that when lengthened into a point or awn these points are always erect or connivent; whilst in *Wissadula*, as in most *Abutilons*, the upper angles or points are more or less divergent or divaricate, giving a peculiar flat top to the fruit. In the remaining *Abutilons* (chiefly of the section *Gayopsis*) the carpels are rounded at the top, but never have the inner angles or connivent points of *Sida*.

ABUTILON, *Gærtn.*

The *A. vitifolium* (*Sida*, Cav.) and, perhaps, a few other South-Western American species differ slightly from the rest of the genus in the more clavate branches of the style with less strictly terminal stigmas; but, as far as I am aware, the character is scarcely sufficiently marked to form even a good section.

SPHÆRALCEA, *A. de St. Hil.*

Harvey proposes to distinguish under the name of *Sphæroma* two species which differ from the others, as *Lavatera* from *Malva*, by the bracts connate at the base, and which has appeared in the Cape species to be confirmed by a difference in habit. But when the American species come to be examined, it will be found that the free and connate bracts pass gradually the one into the other, without any relation to habit or other characters. As to the rule that if a character separates two good genera in one part of a natural order, it must be considered as generic throughout the order, it is a very unsafe one, and the attempted strict adherence to it has been one of the causes of the raising so enormous a number of isolated species to bad genera, and of the consequent confusion, in Cruciferæ, Umbelliferæ, Compositæ, &c.

Meliphlœa, Zucc., a single Mexican species, has been distinguished from *Sphæralcea* by its connate bracts, by the calyx marked inside at the base by a smooth five-lobed portion scarcely thickened enough to be called a disk, and by clavate styles with the stigmas less strictly terminal; but all these characters may be observed, although in a much less degree, in other species passing gradually into the typical form. It is probable, however, that, when better known, the red-flowered species, such as *S. umbellata*, *S. rosea*, &c., may, with Zuccarini's *Meliphlœa*, form a good section of *Sphæralcea*, whilst *Sphæroma* would constitute a third section.

URENA, *Linn.*

As no character has been found to separate this genus from *Pavonia* except the glochidiate points covering the fruit, the *U. speciosa*, Wall., must be transferred to *Pavonia*, in which many species have connate bracts.

PAVONIA, *Cav.*

There are about 60 species known of this genus, varying considerably in habit and in several minor characters derived chiefly from the bracts and the shape and degree of dehiscence of the cocci; and it would require a careful monographic examination of the whole to determine how far the genus is divisible into good sections, and what are the limits to be assigned to it with reference to the closely allied genera *Urena*, *Goethea*, and *Malvaviscus*. *Le-*

bretonia, Schranck, with five broad bracts and indehiscent cocci (sometimes muricate almost as in *Urena*), and *Lopimia,* Nees and Mart., with numerous narrow bracts and the cocci enveloped in mucilage, have now been generally reunited with *Pavonia,* as being connected with other species by intermediate forms. An Australian variety of *P. hastata,* Cav., has been established by F. Müller as a genus under the name of *Greevesia,* as having dimorphous flowers—perfect ones with the usual petals, together with abnormal pentandrous ones with small closed corollas. This is hitherto, as far as I am aware, the only instance observed in Malvaceæ, as the *Stellarias* of the group of *Krascheninikowia* are among Caryophylleæ, but in neither case supplying a good generic character any more than in the numerous other orders where it is now known to occur.

Asterochlæna, Garcke, from the character given in the Bot. Zeit. 1850, p. 666, does not appear in any way to differ from other *Pavonias* with more or less dehiscent cocci.

Goethea, Nees et Mart., has also been united with *Pavonia* ; yet, in two species known to me, the habit and inflorescence, the large coloured calyx, short corolla, &c., seem to indicate differences more important than those which separate *Urena.* The *G. semperflorens,* Mart., however, only known to me from Martius's figure, may possibly sufficiently connect *Goethea* with species of true *Pavonia* to justify the considering it as a section only.

Malvaviscus, Dillen., with erect petals and a baccate fruit, seems at first sight very different from *Pavonia* ; but the former character occurs in several true *Pavonias,* and the succulence of the fruit is variable in degree in different species of *Malvaviscus.* It is, however, known only in a very few, and whether it passes or not into the slightly mucilaginous outer coating of the carpels of *Lopimia* remains to be ascertained. Another character has been pointed out, which, if true, may be important,—that is, that the carpels are said to alternate with the petals in *Malvaviscus,* and to be opposite them in *Pavonia.* I have been unable to verify this character satisfactorily in our dried specimens. It is only in the fresh flower that it can be ascertained whether it may not be due to a greater or less degree of torsion, to which there is a tendency in many Malvaceæ.

JULOSTYLES, *Thw.*

This is a Ceylon tree, which, from some general resemblance in calyx and in habit to *Kydia,* had been published by Gardner as a second species of that genus. Thwaites very properly established it as distinct on numerous grounds, and pointed out the truly Malvaceous character of its anthers. As the structure of the staminal column is also Malvaceous (except that the stamens appear to be limited to ten), as the pollen is remarkably muricate, and as the shape of the corolla with the dark spot at the base of the petals is so much like that of *Hibiscus*, there appears no reason against removing it to the tribe Hibisceæ of Malvaceæ, of which it has all the technical characters. The original species of *Kydia* must also be removed to Malvaceæ, as having truly one-celled anthers; but their shape, as well as the general structure of the staminal column, places the genus in Abutileæ rather than in Hibisceæ.

HIBISCUS, *Linn.*

This, the largest genus among Malvaceæ, comprising about 150 known species, varies more than any other in the calyx and bracts, in the woolly or glabrous seeds, &c.; but the characters appear to us to be too much blended together, or to pass too much one into the other in many instances, to be considered as more than sectional. We would therefore restore to *Hibiscus* the proposed genera *Bombycodendron*, Zoll. (sect. *Bombycella*, DC.), *Lagunæa*, Cav., *Paritium*, A. de St. Hil., and even *Abelmoschus*, Medik. On the other hand, *Thespesia*, Corr., appears to be sufficiently distinct in the calyx, in the clavate style, and in the hard, almost woody fruit, although not always indehiscent even in *T. populnea*, as well as in the apparently constant character of the obovoid, not reniform, seeds: the genus should, however, include the *H. Lampas* and its allies, forming Garcke's subsection *Tiparium* of DeCandolle's section *Azanza*.

Tribe BOMBACEÆ.

I have already given the principal reasons for which I should consider the Bombaceæ as a tribe or suborder rather of Malvaceæ than of Sterculiaceæ, and have observed that it is chiefly with the arborescent Hibisceæ that they stand in close connexion. *Hampea*, indeed, and some allied genera are scarcely separated from them, except by the filaments all terminating the staminal column without any barren truncate or 5-toothed edge; and the latter character is not even quite constant in Hibisceæ, for in some species of *Lagunaria* and *Gossypium* the column is divided to the summit into antheriferous filaments. Some genera of Bombaceæ present indeed exceptional characters, never or seldom observed either in other Malvaceæ or in Sterculiaceæ; but these are generally limited to a few genera only, or are too variously combined to warrant the maintenance of the group as a distinct order. Thus, the digitate leaflets of the five first genera are unknown in Malvaceæ and Tiliaceæ, and in Sterculiaceæ only occur in a very few species of *Sterculia.* The bracteoles in most Bombaceæ are small and inconspicuous, as in *Fugosia*, &c.; but in the subtribe Durioneæ they are united in an involucre which is often entire, completely enclosing the young bud, and bursting irregularly as the calyx enlarges. The calyx, sometimes truncate and toothed as in *Thespesia*, &c., or more rarely 5-cleft as in most Malvaceæ and Sterculiaceæ, is more frequently entire in the young bud, splitting irregularly into three to five lobes as the flower expands. This is rare in Malvaceæ and Sterculiaceæ, but occurs in the subtribe Brownlowieæ of Tiliaceæ. In *Ochroma*, *Cheirostemon*, and *Fremontia* the generally thick calyx-lobes are more or less expanded on the sides into thinner imbricating edges, which is quite exceptional among Columniferæ. The staminal column, usually more or less Malvaceous, is in *Eriodendron*, *Chorisia*, *Cheirostemon*, and *Fremontia* exceptionally divided into five lobes, each of which usually bears two long linear parallel adnate anthers, which might easily be taken at first sight for the parallel cells of single anthers, were it not that these are occasionally three instead of two, that the two are often not strictly parallel, one being longer or inserted rather higher up than the other, and that their real nature is shown by a comparison with the more numerous but similarly adnate anthers of *Matisia*, *Quararibea*, and *Ochroma.* As a further evidence of the close connexion of Bombaceæ with Hibisceæ, I may observe that since the above was read we have received some numbers of the 'Botanische Zeitung,' in which Alefeld proposes to remove *Gossypium*, *Thespesia*, and their allies from Hibisceæ to Bombaceæ.

BOMBAX, *Linn.*

Bombax differs chiefly from *Pachira* in its shorter flowers and in the dense wool enveloping the seeds within the capsule. In *Pachira humilis*, Spruce, and *P. Fendleri*, Seem., the flowers are longer than is usual in *Bombax*; yet as the capsule is woolly inside as in the latter genus, these two species must be transferred to it. The small-flowered *Eriothecas* and the Indian *Salmalia*, proposed as separate genera by Schott, do not appear to be founded on any better character than the greater or less degree of union of the stamens in pairs, which is variable in the same species; and we therefore propose their reunion with *Bombax*. Nor can we see any sufficient grounds for the adoption of *Erione*, *Campylanthera*, and *Gossampinus*, proposed by the same author for single species of *Eriodendron*.

SCLERONEMA, *Benth.*

I give this name to a North-Brazilian plant of Mr. Spruce's, which on a hasty determination I had thought might be a new species of *Myrodia*, taken in the vague general limits usually given to the genus; but, having now more closely investigated the characters of that and other Bombaceous genera, I find that it is much more nearly connected with *Hampea*. The fruit is still unknown, but the flower presents too many points of difference to admit of its being incorporated with that or any allied genus. I therefore propose it as a new genus with the following technical character:—

SCLERONEMA. *Char. gen.*—Calyx campanulatus, sub-5-lobus. Petala 5. Columna staminea brevis, apice divisa in filamenta ∞ (circa 20) superne incrassata, exterioribus brevioribus. Antheræ terminales, adnatæ, breves, uniloculares. Ovarium 2–3-loculare, ovulis in loculis geminis collateraliter ascendentibus. Stylus apice vix incrassatus, minute 2–3-dentatus. Fructus.........

Species unica. S. SPRUCEANA, Benth.—Arbor 100-pedalis, trunco 5 pedes diametro; corona patula. Stipulæ parvæ. Folia alterna, ovali-elliptica v. obovata, breviter et abrupte acuminata, 2–4-pollicaria, petiolo ½–1-pollicari, integerrima, coriacea, glaberrima, nitida, penninervia et basi subtrinervia, costa venisque utrinsecus primariis 6–8 obliquis subtus prominulis; venulæ transversæ, crebræ, reticulatæ. Flores haud magni, in axillis solitarii v. 2–3-ni. Pedicelli 3–4 lin. longi, crassiusculi, minute tomentelli. Bracteolæ sub calyce 2 v. 3, parvæ, calyce multo breviores. Alabastra obovoidea. Calyx apertus 3 lin. longus, fere ad medium sub-5-fidus. Petala duplo longiora, rubra, anguste oblonga, glabra, patentia, in unguem angustata. Tubus stamineus 2 lin. longus, filamenta, præsertim interiora, paullo longiora.

Hab. In North Brazil, on the Rio Uaupès, in *Caatingas* about the cataracts of Jauaratè, where these tall trees project here and there from the mass of low trees and shrubs. R. Spruce, n. 2548. Distributed under the name of *Myrodia parviflora*.

CARPODIPTERA, *Griseb.*

This genus, established by Grisebach on a Cuban plant of Wright's, and which I had at first, following that author, placed among Bombaceæ, proves on examination to differ from all others of the family as well in its stamens and its pendulous ovules as in its fruit and general habit. It is indeed so closely allied to *Berrya* among Tiliaceæ as only to be distinguishable from that genus by the singular, almost petaloid sessile stigmas, and we have accordingly now removed it to the latter family. Among the Kew-Garden drawings is one of a plant of unknown origin, which is evidently the same *Carpodiptera*, although there are three stigmas, instead of two as in the Cuban specimens.

QUARARIBEA, *Aubl.*

This genus is generally referred as a section to *Myrodia*, which it resembles in its fruit, although the flowers are very different. The andrœcium, with its one-celled anthers, is truly Bombaceous, near that of *Matisia*; whilst in *Myrodia* the anthers, in their two parallel or diverging cells, and in their usually definite number and arrangement, are decidedly Sterculiaceous, closely resembling those of several genera of the Helictereæ.

Subtribe DURIONEÆ.

Of the five genera forming this subtribe three are monotypic, and the two others have only two species each. They have, moreover, so much general similarity in their habit, in their scaly indumentum, in their involucre and fruit, that they might have been considered as constituting a single genus. Yet there is so much diversity in their calyx, in the presence and absence of petals, in their style, in the number of ovules, and especially in their andrœcium, that we have, for the present, thought it better to preserve the five genera as usually adopted. Two of them (*Neesia* and *Boschia*) have been occasionally placed among Tiliaceæ, from which they are readily known by their anthers.

The distinction between STERCULIACEÆ and BUETTNERIACEÆ, taken each in their general sense, although adopted by most botanists, rests on no one tangible character. In both, the number of stamens usually bears some definite ratio to that of the sepals. The supposed introrse anthers of Buettneriaceæ originated in a mistake. The "sterile stamens" of most tribes of Buettneriaceæ are the same thing as the "teeth of the staminal column" in *Helicteres* and its allies, and the degree of connation of the stamens varies in both supposed orders. In both also we meet with great diversity in the dehiscence of the fruit and in the embryo and albumen. If, however, we unite the two, rejecting only the

Bombaceæ already absorbed in Malvaceæ, we have a more definite group,—closely allied, it is true, to Malvaceæ, but readily separated by their two-celled anthers; and differing rather more from Tiliaceæ in habit, in their stamens either prominently monadelphous or definite either singly or in fascicles alternating with the sepals. In the few cases where genera with shortly monadelphous stamens have been admitted into Tiliaceæ, they may be known by their pendulous ovules with a ventral raphe, a character very frequent in Tiliaceæ, but, as I believe, unknown in Malvaceæ or Sterculiaceæ. At the same time, the large order of Sterculiaceæ thus formed, consisting of 41 genera and between 500 and 600 species, may be divided into the following seven distinct, well-marked, and for the most part natural tribes.

Tribus I. STERCULIEÆ. Flores unisexuales v. polygami. Calyx sæpe coloratus. Petala 0. Antheræ 5–15 ad apicem columnæ congestæ, brevissime 5-adelphæ v. annulatæ. Carpella fructus libera.

* *Antheræ inordinate congestæ. Semina albuminosa.*

Genera:—1. Sterculia, *Linn.* (*Triphaca*, Lour.; *Ivira*, Aubl.; *Southwellia*, Salisb.; *Chichæa*, Presl, v. *Mateatia*, Vell.; *Cavallium*, Schott; *Firmiana*, Marsigl.; *Erythropsis*, Lindl.; *Brachychiton*, Schott; *Pœcilodermis*, Schott; *Trichosiphon*, Schott; *Delabechea*, Lindl.; *Pterygota*, Schott; *Hildegardia*, Schott; *Scaphium*, Schott; *Pterocymbium*, R. Br.); 2. Tarrietia, *Blume* (*Argyrodendron*, F. Müll.).

** *Antheræ uniseriatim annulatæ. Albumen* 0.

Genera:—3. Cola, *Schott* (*Courtenia*, R. Br.); 4. Heritiera, *Ait.*; 5.? Tetradia, *R. Br.*

Tribus II. HELICTEREÆ. Flores hermaphroditi. Petala 5, decidua. Antheræ 5–15 ad apicem columnæ elongatæ sessiles v. stipitatæ, per 1–3 cum dentibus columnæ (raro obsoletis) v. staminodiis 5 linearibus v. ligulatis extrorsum alternantes. Cotyledones integræ.

* *Ovarium intra basin columnæ sessile. Antheræ sessiles.*

Genus:—6. Myrodia, *Schreb.* (*Lexarza*, Llav.).

** *Ovarium gynophoro columnæ adnato fultum. Antheræ sessiles. Calyx clavato-campanulatus.*

Genera:—7. Reevesia, *Lindl.*; 8. Ungeria, *Endl.*

*** *Ovarium gynophoro columnæ adnato fultum. Antheræ stipitatæ. Sepala demum libera.*

Genera:—9. Kleinhovia, *Linn.*; 10. Helicteres, *Linn.* (*Methorium*, Schott; *Oudemansia*, Miq.; *Isora*, Schott; *Alicteres*, Schott; *Orthothecium*, Schott); 11. Pterospermum, *Schreb.*

Tribus III. ERIOLÆNEÆ. Flores hermaphroditi. Petala 5, decidua. Antheræ ∞ a medio ad apicem columnæ extrorsum stipitatæ. Staminodia 0.

Genus:—12. Eriolæna, *DC.* (*Wallichia*, DC.; *Microlæna*, Wall.).

Tribus IV. DOMBEYEÆ. Flores hermaphroditi. Petala 5, plana, sæpius persistentia. Antheræ 10–20 v. in *Melhania* 5, ad apicem columnæ breviter cupulatæ, rarius elongatæ, stipitatæ, loculis parallelis. Ovarium sessile. Cotyledones bifidæ.

* *Stamina* 20, *omnia antherifera subuniseriata.*

Genera:—13. Ruizia, *Cav.*; 14. Astiria, *Lindl.*

** *Stamina per* 2–3 *rarius solitaria cum staminodiis* 5 *alternantia.*

Genera:—15. Dombeya, *Cav.* (*Assonia*, Cav.; *Xeropetalum*, Del.; *Astrapæa*, Lindl.; *Hilsenbergia*, Boj.); 16. Trochetia, *DC.*; 17. Pentapetes, *Linn.* (*Eriorhaphe*, Miq.); 18. Melhania, *Forsk.* (*Brotera*, Cav.; *Pentaglottis*, Wall.; *Cardiostegia*, Presl; *Vialia*, Vis.).

Tribus V. HERMANNIEÆ. Flores hermaphroditi. Petala 5, marcescentia, plana. Stamina 5, basi breviter, rarius in columnam coalita. Staminodia 0 v. minute dentiformia. Cotyledones integræ.

* *Ovarii loculi* ∞-*ovulati. Semina reniformia, embryone curvato.*

Genera:—19. Hermannia, *Linn.* (*Trichanthera*, Ehrenb.); 20. Mahernia, *Linn.*

** *Ovarii loculi* 2-*ovulati. Semina obovoidea v. ellipsoidea, embryone recto.*

Genera:—21. Physodium, *Presl*; 22. Melochia, *Linn.* (*Riedleia*, Vent.; *Mougeotia*, H. B. et K.; *Anamorpha*, Karst. et Tri.; *Physocodon*, Turczan.; *Lochemia*, Arn.; *Altheria*, Thou.;

Visenia, Houtt.; *Aleurodendron*, Reinw.; *Glossospermum*, Wall.); 23. Dicarpidium, *F. Müll.*; 24. Waltheria, *Linn.* (*Asteropus*, Spreng.).

Tribus VI. Buettnerieæ. Flores hermaphroditi. Petala 5, basi concava, v. in cucullam unguiculatam dilatata, apice acuminata, ligulata, v. rarius nuda. Antheræ 5–15, rarius ∞, ad sinus urceolæ v. cupulæ dentatæ v. lobatæ per 1–3, rarius per 4–5, sessiles v. stipitatæ.

* *Antheræ inter staminodia* 2–∞.

Genera:—25. Glossostemon, *Desf.*; 26. Abroma, *Jacq.*; 27. Theobroma, *Linn.*; 28. Herrania, *Goud.*; 29. Guazuma, *Plum.* (*Bubroma*, Schreb.; *Diuroglossum*, Turczan.).

** *Antheræ inter staminodia solitariæ, nunc triloculares.*

Genera:—30. Ayenia, *Linn.* (*Cybiostigma*, Turczan.); 31. Buettneria, *Linn.* (*Pentaceros*, G. F. Mey.); 32. Rulingia, *R. Br.* (*Achilleopsis*, Turczan.); 33. Commersonia, *Forst.* (*Medusa*, Lour.).

Tribus VII. Lasiopetaleæ. Flores hermaphroditi. Petala 0 v. squamæformia. Stamina basi leviter connata, 5 antherifera sepalis alterna, sterilia totidem v. pauciora v. 0.

* *Antheræ* 2-*rimosæ*. *Carpella matura distincta v. solitaria.*

Genera:—34. Seringia, *Gay*; 35. Keraudrenia, *Gay*.

** *Antheræ* 2-*rimosæ*. *Capsula loculicide* 3–5-*valvis*.

Genera:—36. Thomasia, *Gay* (*Leucothamnus*, Lindl.; *Rhynchostemon*, Steetz); 37. Hannafordia, *F. Müll.*; 38. Guichenotia, *Gay*.

*** *Antheræ* 2-*porosæ*. *Capsula loculicide* 3–5-*valvis*.

Genera:—39. Sarotes, *Lindl.* (*Ditomostrophe*, Turczan.); 40. Lasiopetalum, *Sm.* (*Corethrostyles*, Endl.; *Asterochiton*, Turczan.); 41. Lysiosepalum, *F. Müll.*

Sterculia, *Linn.*

This large genus presents considerable diversity in foliage, in the size, shape, and colour of the calyx, in the size, shape, consistence, and degree of dehiscence of the carpels, &c., and it is upon these characters chiefly that Schott (Meletemata, pp. 32 & 33) proposed the dividing it into thirteen distinct genera. Endlicher, however, considering them to be of minor importance, in his 'Genera Plantarum' reunited them all as sections of *Sterculia*, with the ex-

ception of *Pterygota*, characterized by its winged seeds. Brown has since (Pl. Jav. Rar. p. 224), with his usual perspicuity, pointed out the more important characters to be derived from the arrangement of the anthers and the structure of the seed. He reunites many of Schott's genera with *Sterculia*, but still admits ten distinct ones, including two not mentioned by Schott. Some of these are monotypic, and founded on the position of the radicle with relation to the hilum—next to it, at the opposite end, or between the two. Important, however, as similar characters are in most cases, they can yet be regarded only as artificially sectional when separating single species not otherwise distinct from the main group. In the case of *Firmiana*, the two species proposed to be generically united, as having in common the intermediate position of the radicle, are in habit and in their calyx as different from each other as any two species of the whole group. But we have no hesitation in adopting as a good genus the African *Cola* (including *Courtenia*); for there are several species at once distinguished from *Sterculia* by their anthers adnate in a single ring, and by their want of albumen, accompanied by other minor characters. *Courtenia*, with divaricate instead of parallel anther-cells, appears better considered as a section than as a genus; for neither here, nor in other Sterculiaceous genera where the same diversity occurs, does it entail any other tangible differences. *Tetradia*, Br., must also be provisionally admitted; for the fruit and seed are as yet unknown, and may present characters corroborative of those derived from the flower. But we would restore to *Sterculia*, as mere sections, *Firmiana*, *Brachychiton*, *Pterygota*, *Hildegardia*, *Scaphium*, and *Pterocymbium*; including in *Brachychiton* the *Delabechea* of Lindley, in which we find the radicle next the hilum as stated by Brown, not remote from it as described by Lindley.

TARRIETIA, *Blume.*

This genus, allied in most respects to *Sterculia*, has the indumentum and inflorescence of *Heritiera*, with much smaller flowers and very peculiar samaroid carpels. It includes an Australian species published by F. Müller under the name of *Argyrodendron*. The leaves are digitately compound, with five leaflets according to Blume's figure and description, three only in the specimens distributed by Miquel as Blume's species, as well as in the Australian species.

MYRODIA, *Schreb.*

We have already stated our reasons for excluding from *Myrodia*, and referring to Bombaceæ, the *M. longiflora*, forming the genus *Quararibea*, Aubl., as well as the species I had provisionally named in Spruce's plants *M. breviflora*, but which I have above described under the name of *Scleronema*. On the other hand, Endlicher proves to have been correct in his suggestion that *Lexarza*, Llave, belongs to *Myrodia*. Specimens agreeing in every respect with that author's description of his *L. funebris* are in the Hookerian herbarium, from Oaxaca, *Andrieux*, n. 512, from Papantla, *Liebmann*, and from near Sonsonate in San Salvador, *Sutton Hayes*. The flowers are considerably larger than in *M. turbinata*, from which it may be thus distinguished:—

> *M. funebris*, foliis subtus ad axillas venarum tomentoso-barbatis, pedicellis calyce brevioribus 2–3-bracteatis, antheris 25–30.—*Lexarza funebris*, Llave in Llave et Lex. Nov. Veg. Descr. fasc. ii. p. 7.

DOMBEYA, *Cav.*

In a paper of Dr. Planchon's in the 6th vol. of the 'Flore des Serres' (which we have been unable to procure, and which is therefore only known to us from the abstract in Walpers' 'Annales,' iv. p. 325), the genus *Dombeya* is well characterized and divided into sections; and *Xeropetalum*, Delile, is correctly included. We would also agree with him in considering the *Astrapæa viscosa*, Bot. Mag., and its allies as a section only of *Dombeya*, in which the staminal tube exceeds the ovary; but, in so doing, it does not appear possible to exclude *Hilsenbergia*, Boj., and *Astrapæa*, Lindl., which only differ in the staminal tube being still longer. Nor can we reject *Assonia*, Cav., which only differs slightly in the bracts from the smaller-flowered, short-columned species. Thus constituted, *Dombeya* forms a well-marked and natural genus of about 24 species, only separated, however, from *Ruizia* and *Astiria* by the sterile stamens or lobes of the column.

TROCHETIA, *DC.*

This genus, extended to its proper limits, becomes a very natural one, differing from *Dombeya* in its inflorescence and the shape of its flowers, in the more coriaceous calyx, and more numerous ovules in each cell of the ovary; from *Pentapetes* in its arborescent habit, in the calyx, and in the style more divided at the top; from *Melhania*, into which some species have been hitherto placed, it is still more distinct in habit and calyx, and in the anthers always 2, 3 or 4 between each two sterile stamens, instead of one only as in *Melhania*. The species we have seen are *T. grandiflora*, Lindl., with the anthers in fours between each two sterile stamens; *T. uniflora*, DC., and *T. parviflora*, Boj., with the anthers in threes; and *T. decanthera* (*Melhania decanthera*, DC.), *T. laurifolia* (*Melhania laurifolia*, Boj.), *T. erythroxylon* (*Melhania erythroxylon*, Ait.), and *T. melanoxylon* (*Melhania melanoxylon*, Ait.), all with two anthers only between each two sterile ones. All the species are from Mauritius or Madagascar, except the two last, which are from St. Helena—or rather *were*, for both are now said to be extinct. This distribution of so marked a genus over these distant islands, without any traces of it (as far as known) in the intermediate continent, may suggest some curious speculations as to the gradual extinction of ancient floras. These two St. Helena species are indeed described as pentandrous only; but I have certainly found the anthers in pairs in all the specimens I have seen, although with their short filaments united: that is, however, partially the case in some of the Mauritius species.

PENTAPETES, *Linn.*

This genus, occasionally made the receptacle of several doubtful Dombeyeæ, is now reduced to the single *P. phœnicea*, Linn.; for the *P. angustifolia*, Bl., is generally admitted to be a mere variety. Miquel has indeed distinguished it as a genus under the name of *Eriorhaphe*; but on carefully studying his description, I find every part of it (including the nerve-like plumose placenta, whence he derived his name) applicable to the common *P. phœnicea*, except, perhaps, the number of anthers, 10 only instead of 15—that is, two instead of three between each two sterile stamens. From having observed, however, that one or two anthers are wanting in some flowers of our specimens, I should suspect that the number 10 was accidental in the flower examined by Miquel.

MELHANIA, *Forsk.*

Melhania, deprived of the arborescent species referred as above to *Trochetia*, and including *Brotera*, Cav., *Pentaglottis*, Wall., *Cardiostegia*, Presl, and *Vialia*, Vis., becomes a very natural and well-defined genus, distinguished from all other Dombeyeæ by the anthers solitary between each two sterile stamens, and readily known by their habit approaching that of *Serræa* among Malvaceæ rather more than that of *Hermannia*, to which it has been compared. It includes about sixteen species, dispersed over Africa and the warmer, drier regions of Southern Asia and Northern Australia.

Melochia, *Linn.*

We follow A. Gray and others in referring to this genus, as sections, not only *Riedleia*, Vent., including *Mougeotia*, H.B. et K., *Lochemia*, Arn., and *Altheria*, Thou., but also *Visenia*, Houtt., to which belong *Aleurodendron*, Reinw., and *Glossospermum*, Wall. As to *Physodium*, Presl, from the fragmentary specimens of two Mexican species in the Hookerian herbarium, it appears to have a very different habit, and perhaps the very large Physalis-like mature calyx may suffice to keep it distinct, but it requires to be better known before the point can be decided. The recently proposed genus *Anamorpha*, Karst. et Tri., and the two species of *Physocodon*, Turczan., are all founded on the *Melochia* (*Mougeotia*) *inflata.*

Glossostemon, *Desf.*

This is a Persian plant, not very common in our herbaria, but interesting in the structure of its andrœcium, as affording perhaps some clue to the explanation of the anomalies observed in the homology of the flowers of Sterculiaceæ with respect to the position of the stamens. We have seen that the staminal column in this Order is usually divided into a definite number of barren or antheriferous teeth or filaments, which is usually some multiple of the sepals or petals. In a very few genera (e. g. *Astiria*, and probably *Assonia*) these filaments, four times as many as the sepals, all bear anthers, and are all apparently in a single row and equidistant—an occasional occurrence in different Orders of various staminal homologies: but in the majority of Sterculiaceæ, the five innermost divisions, *always opposite the sepals*, are without anthers, and take the name of teeth or staminodia, according to their degree of development; and between them, and consequently more or less *alternate with the sepals* or opposite the petals, are 1, 2, or more sessile or stipitate anthers, always turned outwards and lying outside the staminodia in the bud. In a few genera (e. g. *Waltheria* and some *Melochias*) the staminodia almost or even totally disappear, and there remain only 5 stamens, connate in a ring or cup at the base, but each tapering into one anther-bearing filament opposite the petal, instead of alternating with it as is usually the case where the stamens and petals are isomerous. It has been attempted, especially by A. Gray, to explain this anomaly as a case of *dédoublement*; that is to say, by supposing that each stamen with its corresponding petal arises from the splitting of one homological leaf; the whole flower consisting of three whorls only, of five leaves each, the outer one forming the calyx, the next the petals and stamens, and the inner one the carpels. But when we consider that in the whole group of Columniferæ the petals are either perfectly distinct and sometimes distant from the staminal column, or, if they adhere to it near the base, the attachment is superficial only, the vascular systems remaining perfectly distinct, and that even this attachment is wanting in those genera where *dédoublement* is most relied upon, we must have something more than mere conjecture, some strong cases of intermediate structure, to counteract the evidence of our senses, and establish in theory that two totally disconnected organs are, in fact, branches of one organ.

It is well known that the (homological) leaf is very ready to ramify laterally—in its own plane; but, as far as my experience extends, ramification in a direction at right angles to that plane, either by the production of excrescences from either surface, or by anything approaching to a splitting or separation of the two surfaces, is confined to the three following categories:—

1. The production of epidermal excrescences, such as hairs, prickles, &c., never converted into real organs.

2. Prolification, the result of plethora or of some accidental determination of sap to particular points, resulting in abnormal foliaceous appendages, or adventitious roots and buds, which may become independent individuals, but never efficient organs of the mother-plant.

3. The production of petiolar glands, which alone can have any bearing on our present case. These glands, which I have called petiolar to distinguish them from several other bodies bearing usually the same name of glands, are not, however, strictly confined to the petiole. In most stem-leaves where they occur, there are two or a single one of them at or near the summit of the petiole or the base of the limb; but they are sometimes more numerous, irregularly placed on the petiole, rarely on some of the principal veins or in their axils, but not unfrequently on the margin of the leaf at the extremity of the principal veins; and they are usually disk-shaped, concave, or cup-shaped. In bracts they sometimes attain a size very large in proportion to the rest of the bract. In the petal they are very apt to assume the form of an entire or two-lobed scale at the base of the lamina or on the claw, sometimes as large as the rest of the petal, sometimes reduced to a mere concavity in the petal, or to a slight discoloration or alteration in the texture of its surface. In the stamen, according to

views I stated many years ago (Hook. Kew Journ. Bot. i. 358), and of which I have seen no refutation, these glands are represented by the anther-cells, the petiole by the filament and connective, and the lamina either totally abortive or represented by petaloid appendages to the connective. Keeping this theory in view, we may well conceive that a *dédoublement* of the petal may produce the inner petaloid scale of some Sapindaceæ, Violaceæ, Bixaceæ, &c., or the fimbriate scales in the tube of *Cuscuta* and other gamopetalous flowers, or the corona of *Passiflora*, the cup-shaped nectary of *Narcissus*, &c.; or, again, that a *dédoublement* of the stamens may result in the staminal corona of Asclepiadeæ when arising from the gynostegium. But that there is anything of the kind in Sterculiaceæ is, I think, fully disproved by the Buettnerieæ, where this supposed formation has been most relied upon; for here the petiolar gland of the petal-leaf forms the apex of the hood, connivent over or adhering to the staminal column, and is perfectly distinct in origin and position from the anther which it so curiously encloses*.

How then are we to account for the disturbance occurring in Sterculiaceæ of the usual alternation in the staminal whorls? I find that on soaking the androecium in several genera, and more especially in *Glossostemon,* it separates very readily into five bodies (adelphia), normally alternating with the petals, each one ending in a point or appendage (the teeth, barren lobes, or staminodia of the staminal column), and bearing the anthers on its margin on each side of the central point. Might we not consider each such body or fascicle of stamens as one staminal leaf, with branched veins, the central vein bearing no anther (or altered gland), the lateral branches each terminating in an anther (or altered gland) corresponding to the marginal glands on the stem-leaves of several species of *Homalium*, *Ranara*, Euphorbiaceæ, &c.? Where the number of anthers between each two staminodia is an even one (2, 4, 6 or 8), the staminal leaf has the same number of anthers on each side of the central nerve; where it is an odd one (1, 3, or 5), there is one more on one side than on the other,—a circumstance readily explained by the great tendency to obliquity in the parts of the floral whorls, where the æstivation is so strongly contorted. In confirmation of this view I may also observe, that in *Melhania* I never find the anther-bearing stamen exactly opposite the centre of the petals, but somewhere between the margin and the midrib*.

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* The supposed lateral *dédoublement* in the staminal leaves of the inner whorl in Cruciferæ is, to my mind, equally mythical; and I hope, on an early occasion, to lay before the Society my reasons for coming to this conclusion.

If the supposition, or as some would say conjecture, that the andrœcium of most Sterculiaceæ consists of five leaves, each bearing 1, 2, or more marginal anthers, be admitted, we must, in order to account for the internal position of the terminal point and for the extrorse direction of the anthers, further suppose that the edges of the leaf are slightly revolute in æstivation, not involute or inflexed as is usually the case with staminal leaves when not valvate or open. Similar exceptions to the ordinary æstivation occur, however, in other instances. Ordinary extrorse anthers do not indeed necessarily involve such an explanation, for petiolar glands may occur on the back as well as on the front of the leaf; but in many Laurineæ for instance, where the stamens are in three or four series, there is evidently a diversity in their æstivation, those of the outer series being involute, and the inner ones revolute.

ABROMA, *Jacq.*

The so-called strophiola in this genus is not an expansion of the hilum of the seed, nor yet of each separate funiculus, but a projection of the general placenta upon which the seeds are separately attached.

A. nitida, Pœpp. et Endl., belongs to *Herrania*, as well as the *A. Mariæ*, Mart., already referred to that genus.

GUAZUMA, *Plum.*

The genus *Diuroglossum*, Turczan., described in the Moscow Bulletin, 1852, is nothing but the common *Guazuma tomentosa.*

AYENIA, *Linn.*

In this genus and in a few species of the closely allied *Buettneria*, the anthers, solitary between each two sterile stamina or teeth of the andrœcium, have three parallel cells instead of two. This seems to indicate that the anther is compound, and may admit of two solutions. Grisebach suggests that the three cells may represent the three anthers of *Guazuma*, which have divaricate but distinct cells, but that here, by their closer combination, these divaricate cells have become completely confluent, without any trace of a transverse separation or contraction; and that we have thus the one-celled anthers of Malvaceæ, thereby doing away with the chief distinctive character of the two orders. I have, however, in vain searched for any species, either of *Ayenia* or *Guazuma*, showing any intermediate state between the ordinary anthers of the two genera; and in all other respects the two genera, though not inappropriately following each other in the linear series, have wide constitutional differences, in the calyx, the petals, the number of ovules, the styles, and, above all, in the embryo. On the other hand, in the great majority of *Buettnerias* the anthers have two parallel cells, which have as completely the appearance of belonging to one anther only as those of *Rulingia*; and when the third cell is present, might it not be considered as the half of an anther belonging to the adjoining staminal leaf, under the theory above suggested in explanation of the andrœcium of Sterculiaceæ? The three-celled anthers of *Ayenia* would then be explained as consisting of one complete two-celled, and one dimidiate anther.

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* Whilst suggesting the above explanation of the abnormal position of the stamens in Sterculiaceæ, I am well aware that the fact of the outer stamens being opposite the petals in Geraniaceæ and their allies must be accounted for on other grounds.

Cybiostigma of Turczaninow is founded on the common *Ayenia magna*, L., and a closely allied species, and has nothing to separate it generically from the other species.

RULINGIA, *R. Br.*

Achilleopsis, Turczan. (Walp. Ann. ii. 165), does not appear to be sufficiently distinct from *Rulingia*. I do not find the stamens quite free from the base, although much more shortly united than in most *Rulingias*.

LASIOPETALEÆ.

In this tribe, entirely Australian, where the petals are wanting or rudimentary, the andrœcium may be formed on a somewhat different principle from that of the other Sterculiaceæ. The stamens of the outer whorl opposite the sepals are reduced to barren filaments or, like the petals, entirely deficient; and the five anther-bearing stamens, alternate with the sepals as in other pentandrous Sterculiaceæ, may, however, really belong to the inner staminal whorl.

The genera of this tribe have probably been too much multiplied on characters of very little importance. Even the difference in the dehiscence of the anthers, by short pores or long slits, is not always clearly marked; and although we have still availed ourselves of it as distinguishing considerable groups, these are not so natural as could have been wished. The two first genera, *Seringia* and *Keraudrenia*, are well separated from all the others by their ripe carpels distinct or solitary, not forming a loculicidal capsule; and the two are equally well distinguished by the seeds ellipsoid with a straight embryo in *Seringia*, reniform with a curved embryo in *Keraudrenia*. The calyx and habit of the former also approach those of *Commersonia*, whilst those of *Keraudrenia* are nearer to *Thomasia* and *Lasiopetalum*. But *Seringia* must be understood as originally limited by Gay, and *S. nephrosperma*, F. Müll., transferred to *Keraudrenia*. Of the remaining six genera which we have adopted, three (*Thomasia*, *Guichenotia*, and *Hannafordia*) have the anthers opening in pores; and in three (*Sarotes*, *Lasiopetalum*, and *Lysiosepalum*) they open in slits. *Guichenotia*, *Hannafordia*, and *Sarotes* are distinguished by their calyx marked when enlarged by 3 or 5 prominent ribs on each sepal, and *Hannafordia* by the lanceolate petals much more developed than in other Lasiopetaleæ; and lastly, *Lysiosepalum*, F. Müll., which I have not seen, is said to be well marked by the sepals entirely free from the base: but all these must be admitted to be rather artificial than natural distinctions.

As to the other proposed genera, we would reduce *Leucothamnus*, Lindl., and *Rhynchostemon*, Steetz, to *Thomasia*; *Ditomostrophe*, Turczan., to *Sarotes*; and *Corethrostyles*, Endl., and *Asterochiton*, Turczan., to *Lasiopetalum*.

The apparently ternately verticillate leaves of *Guichenotia*, *Sarotes*, and some *Lasiopetala*, in which one leaf is always larger than the two others, appear to correspond to the leaf with two leaf-like stipules of other *Lasiopetala* and of *Thomasia*. In a few *Lasiopetala* the leaves appear to be really opposite, which is, I believe, the only instance in the whole Order of Sterculiaceæ.

During the ten months which have elapsed since this paper was sent in to the Society, fresh materials have accumulated, which have enabled me to make some slight improvements in the arrangement of a few genera, as well as a few additions, but not so as to interfere with the observations above given. The *Kydia axillaris* of Thwaites, now that the flower is known, proves to be a new genus allied to *Julostyles*, to which must also be referred *K. jujubifolia*, Griff. As Mr. Thwaites did not send any name with his notes, we have given it that of *Dicellostyles*, in allusion to its forked style. A Mauritius specimen, long overlooked among the unnamed ones in the Hookerian herbarium, can only be referred to a new genus, allied on the one hand to *Dombeya* and on the other to *Trochetia*, to which we have given the name of *Cheirolæna*. And amongst Griffith's unnamed specimens we have also a new genus of Durioneæ, allied to *Boschia* and *Neesia*, remarkable for its very small flowers with a depressed circular calyx marked by five cavities at the base of its lobes, with corresponding protuberances outside, and which have suggested the name of *Cœlostegia*. As the part of our 'Genera Plantarum' comprising these Orders is now in the press, it would be superfluous to repeat here the characters of these new genera.

With reference to the observations above given on the homology of the stamens of Buettnerieæ, I would add that Professor Oliver, whose opinions on similar questions must always have great weight, in a paper lately read before the Society, objects to my comparison of the anther of the staminal leaf with the petiolar glands of the leaf properly so called. I freely admit that plausible arguments may be brought forward against my views; but upon a full reconsideration of the subject, I confess myself still further inclined to believe that the explanation I have suggested is likely to prove correct.

I have also to add to my former paper on Tiliaceæ, that, with reference to *Antholoma*, a cursory inspection of specimens during my visit to Paris last autumn, and the examination of a bud and flower kindly sent to me by M. Brongniart, have fully confirmed Dr. Planchon's suggestion that the genus is Tiliaceous—not far from *Elæocarpus*. It is indeed closely allied to *Sloanea*, differing chiefly in the petals united into a tubular, almost conical corolla. I understand that M. Baillon has fully described the plant in a number of his 'Recueil d'Observations' which has not yet reached us.

March 1862.

West African Tropical Orchids.

By Dr. LINDLEY, F.R.S., F.L.S., &c.

[Read November 7, 1861.]

MOST of the plants included in the following succinct enumeration have been obtained in the Expedition to the West Coast of Africa, under the command of Dr. Baikie, R.N. The larger part resulted from the investigation of the late Mr. Barter, a most zealous and skilful collector, who unfortunately fell a victim to his exertions. The remainder have been sent home by Mr. Gustav Mann, who may be fairly pronounced to be second to no one. For the opportunity of examining and describing them, I am indebted to Sir William Hooker.

Till the present time, the species of the Order known to exist in the region over which these collections have extended, were little known; the colony of Sierra Leone having supplied the greater proportion of the 19 previously described. Those now enumerated inhabit the middle and lower course of the Niger River, the country extending from Lagos to the Cameroons, with several from Fernando Po, where, however, *Ansellia africana*, the only species before known from that island, was not seen by Mr. Mann. In all, I have examined 67 species, of which 48 were previously undescribed.

Of those bearing a well-marked resemblance to other portions of the African Flora, the principal part resemble Cape species. These are *Polystachya alpina*, near *P. Ottoniana*; *Penthea Pumilio*, a striking addition to a small Cape genus; *Angræcum arcuatum*, identical with the plant from Albany; and *Cymbidium adenoglossum*, which resembles the *C. tabulare* of Table Mountain.

Others must be compared with Eastern Africa: thus, *Amphorchis occidentalis* is the second species of a genus inhabiting the Isles of France and Bourbon; *Corymbis disticha* is the same as the plant from the same islands; *Calanthe corymbosa* is very near *C. sylvatica* of the Isle of France; *Habenaria præalta* is undistinguishable from the Bourbon species; and *Bolbophyllum lupulinum* has all the appearance of *B. occultum* from the Mauritius and Bourbon, although the structure of the flowers is widely different; finally, there is a new *Notiophrys*, near *N. occulta*, from the same islands. To these special resemblances must be added the generic similarity among many species of *Bolbophyllum*, *Polystachya*, and *Angræcum*, in Eastern and Western Africa: the collections containing 14 species of the first, the same number of the third, and 9 of the second.

Perhaps the most striking geographical fact consists in the presence of the Asiatic *Epipogum nutans* at Ambas Bay, a place a little to the north of the embouchure of the Cameroons River.

It is worthy of remark in conclusion that there is little resemblance between the species now described and those of Abyssinia; there is no *Satyrium*, no *Peristylus*, no *Pterygodium*; and the species of *Habenaria* are quite dissimilar. It is only in the case of *Eulophia guineensis*, the *Saccolabium abyssinicum* of Achille Richard, that the identity of a West African and Abyssinian plant has been ascertained.

LIPARIS, *Richard.*

1. Sp.? in fruit only.
"On Mangroves, R. Nun." (2122) *Barter.*

2. Sp.? no flowers.
"Terrestrial, in a swamp. Flowers deep red. Lagos." (2202) *Barter.*

3. L. GUINEENSIS? *Lindl. in Bot. Reg.* vol. xx. t. 1671.
"Flowers small, purple. Prince's Island." (1980) *Barter.*

The flowers are very young; but the plant would certainly be referred to *L. guineensis* were they green instead of purple.

4. Sp.? no flowers.
"On rocks. Prince's Island." (2029) *Barter.*

BOLBOPHYLLUM, *Thouars.*

§ *Ptiloglossum*; labello elastice articulato, plumoso.

1. **B. CALAMARIUM**, *Lindl. in Bot. Reg.* 1843, *Misc.* 109; *Bot. Mag.* t. 4088.
"Flowers chocolate. Labellum fringed with long hairs. Town of Nupe." (1482) *Barter.*

2. **B. RHIZOPHORÆ**; pseudobulbis ovatis diphyllis, foliis oblongis conduplicatis obtusis, spicis multifloris pendulis, bracteis subrotundo-ovatis reflexis margine membranaceis, rachi floribusque scabris, sepalo dorsali lineari lateralibus intus pubescentibus subrotundis cuspidatis multo longiore, petalis linearibus angustissimis glabris apice setaceis, labello lineari intus villoso sub apice mucronulato.
"On Mangroves. Flowers uniform deep purple. R. Nun." (2118) *Barter.*

A very distinct species, with the small flowers and angular filiform rachis covered with a purple rough fur. The bracts are quite smooth.

3. **B. DISTANS**; pseudobulbis quadrangulis brevibus monophyllis, foliis loratis basi angustatis obtusis spica disticha longioribus, bracteis glumaceis distantibus, sepalis petalisque setaceo-acuminatis, labello a basi concava carinata longissime setaceo villosissimo.
"Epiphyte. Banks of the R. Nun, Sept. 1860." (525) *Mann.*

Leaves about 6 inches long. Scape from 2 to 4 inches long, with about two tight vaginæ. Hairs of the lip apparently violet.

4. **B. COCHLEATUM**; pseudobulbis angustis teretibus diphyllis, foliis angustis obtusis, scapo plurivaginato paulo breviore, spica densa disticha bracteis cochleatis imbricatis, sepalis carnosis subæqualibus, petalis ovatis carnosis columnæ æqualibus, labello linguiformi supra carinato sepalis breviore, columnæ dentibus erectis obtusis postice emarginatis.
"Epiphyte. Fernando Po, at 4000 feet, Dec. 1860." (643) *Mann.*

The whole inflorescence seems to be purple, and is not unlike that of *Pholidota imbricata*. The lip is unusually small in this section of the genus.

5. **B. TENUICAULE**; rhizomate filiformi reptante, pseudobulbis distantibus tenuibus diphyllis, foliis linearibus emarginatis, scapo filiformi plurivaginato, spica laxa bracteis glumaceis obtusis haud imbricatis, sepalis petalisque acutis æqualibus, his linearibus acuminatis, labello oblongo concavo obtuso, columna biseta.

"Epiphyte. Fernando Po, at 5000 feet, Dec. 1860." (648) *Mann.*

Much like a small specimen of the next, but differing in the characters assigned to it.

6. **B. GRAVIDUM**; pseudobulbis ovatis angulatis diphyllis, foliis linearibus acutiusculis, scapo multivaginato longiore, spica oblonga imbricata, bracteis oblongis cymbiformibus, sepalis subæqualibus carnosis canaliculatis acuminatis reflexis, petalis oblongis, labello linguiformi obtuso, columna antice ventricosa appendicibus 2 antice repandis.

"Epiphyte. Fernando Po, at 3000 feet, Dec. 1860." (650) *Mann.*

Resembles *B. cochleatum*, but its spike stands high above the leaves, and the petals and column are quite different; the lip too is larger in proportion.

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7. **B. LUPULINUM**; pseudobulbis ancipitibus oblongis diphyllis, foliis oblongis obtusis basi angustatis, scapo laxe vaginato pseudobulbo breviore, spica oblonga multiflora bracteis maximis distichis cymbiformibus dense imbricatis nigro furfuraceis, floribus intra bracteas absconditis parce scabridis, sepalis ovatis carnosis, petalis nanis filiformibus, labello oblongo carnoso margine tenui serrato apice calloso obtuso refracto, columna mutica, anthera apice producta incrassata, polliniis 2 connatis.

"Epiphyte. Flowers dark purple. Ambas Bay, Febr. 1861." (783) *Mann.*

In general appearance much like Du Petit Thouars' figure of *Bolbophyllum occultum*, a plant of which I have seen no specimen. They are, however, entirely different in the minute parts of fructification: *B. occultum* having the feathery lip of a Ptiloglot and the two setæ usual in *Bolbophyllum*, while in the species now described the lip is a solid fleshy plate, and the column has no setæ; moreover it has a reflexed white glandular point to the purple lip, an anther with a great fleshy apex, and a pair of oblong connate pollen-masses, all characters at variance with *B. occultum*. It is still more like *B. tetragonum* in structure, though wholly different in habit.

The pseudobulbs are thin, 3 inches long, with an imperfect third edge on one side; and the leaves 9 inches long by 1½ inch wide.

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8. B. Elaidum; repens dense cæspitosum, pseudobulbis depressis diphyllis, pedunculo setaceo unifloro foliis lineari-lanceolatis multo longiore, floribus sessilibus bibracteatis, sepalis glabris petalisque minoribus apice setaceis, labello conduplicato lineari obtuso glabro basi dilatato.

"Flowers greenish white. On oil Palms, Brass." (1841, and 73) *Barter*.

There are two unequal diaphanous acuminate bracts beneath each flower, of which the lower is ovate, the upper linear.

9. B. intertextum; rhizomate ramosissimo intricato, pseudobulbis ovatis monophyllis, foliis oblongis ovalibusque apiculatis, scapo setaceo multo longiore 2–3-floro, bracteis angustis recurvis ovario longioribus, sepalis membranaceis setaceo-acuminatis, petalis oblongis emarginatis, labello ovato obtuso carnoso sulcato glabro, columna bidentata.

"Epiphyte, green. Banks of the Nun, Sept. 1860." (527) *Mann*.

Much like the last; but the flowers are not solitary, the leaves are not in pairs, the petals are not setaceous, nor is the lip attenuated.

10. B. apetalum; pseudobulbis angulatis diphyllis foliis æqualibus, scapis setaceis foliis longioribus, spica laxa pauciflora, sepalis carnosis angustis galeatis, petalis obsoletis, labello longo angusto cuneato cucullato scabriusculo apice glabro reflexo carnoso, columna utrinque dilatata carnosa.

"Bagroo River, 1861," *Mann*; and probably "on oil Palms, Brass." (72) *Barter*, without flowers.

This singular little species has flowers like miniatures of *Aconitum Lycoctonum*. For petals there are only two minute rudiments, the lip resembles that of a Polystachya, and the column has two deep fleshy purplish cheeks.

11. B. micropetalum; pseudobulbis angulatis diphyllis foliis linearibus emarginatis obtusis æqualibus, scapo setaceo foliis longiore, spica pauciflora, bracteis brevibus cucullatis, floribus subrotundis, sepalis acutis, petalis setaceis obsoletis, labello cuneato cucullato antice recurvo, columna membranacea brachiis truncatis denticulatis.

"Epiphyte. Fernando Po, at 4000 feet, Dec. 1860." (644) *Mann*.

In general habit like *B. intertextum*; two minute bristles are all that represent petals; the arms of the membranous column are

as if cut off by a knife. The little flowers appear to be yellow. Seems to be related to *Bolbophyllum nutans* of Du Petit Thouars.

12. B. **FALCIPETALUM**; pseudobulbis ovalibus ancipitibus diphyllis, foliis linearibus emarginatis, scapo longiore scabriusculo ad basin fere florido, bracteis ovatis semiamplexicaulibus refractis, sepalis acutis dorsali latiore, petalis columnæ pedem decurrentibus linearibus falcatis, labello obtuse hastato basi concavo 3-lineato, columnæ angulis incurvis.

"Epiphyte, yellow. Banks of the Nun, Sept. 1860." (526) *Mann.*

The narrow sickle-shaped petals curve forwards over the lip, like a pair of sharp horns.

13. B. **PAVIMENTATUM**; pseudobulbis densissimis subrotundo-oblongis compressis monophyllis, foliis oblongis planis pedicellatis, scapo foliis longiore filiformi erecto arcte 4-vaginato, spica densa, floribus carnosis glabris bracteis obtusis longioribus, sepalis ovatis acuminatis obtusis, petalis ovatis retusis, labello brevi carnoso tomentoso obtuse acuminato revoluto, columna biseta.

"Epiphyte. Calyx green, corolla purple. Banks of the Nun, Sept. 1860." (519) *Mann.*

The ground is closely paved with the pseudobulbs of this species, which may be compared with such as *cupreum* or *recurvum*.

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14. B. **COMATUM**; pseudobulbis ovatis angulatis monophyllis, foliis papyraceis spathulatis acuminatis, scapo pseudobulbis duplo longiore laxe vaginato, spica oblonga densissima villosissima, sepalis acuminatis, petalis subrhombeis acutis labelloque oblongo obtuso canaliculato scabridis, columnæ brachiis erectis linearibus retusis.

"Epiphyte. Fernando Po, at 2000 feet, Dec. 1860." (642) *Mann.*

A very singular species, little like any other. The heads of flowers are from an inch to 1½ inch long, so entangled with hairs as to resemble a mass of wool.

MEGACLINIUM, *Lindley.*

1. M. **OXYPTERUM**, *Lindl. in Bot. Reg.* 1839, *Misc.* 10.

"Flowers yellow. Prince's Island." (2026) *Barter.*

The leaf is broader and more oval than in the cultivated plant.

2. M. **PURPURATUM**; folio solitario oblongo, rachi angusta obtusa cuspidata crenata, bracteis oblongis apiculatis margine revolutis, sepalis aristatis dorsali fornicato, petalis setaceis, labello ovato-lineari basi denticulato.

"Flowers and whole spike purple. Brass." (1854) *Barter.*

CALANTHE, *R. Brown.*

1. C. CORYMBOSA (§ *Eucalanthe B.*); foliis latis 5-nerviis acuminatis basi longe angustatis subtus pilosiusculis, corymbo denso tomentoso, bracteis lineari-lanceolatis ovariis longioribus, labello cuneato bilobo apiculo interjecto apice utrinque truncato dentato basi verrucoso dente parvo porrecto utrinque, calcare filiformi arcuato.

"Herbaceous, 1½ foot high. Corolla white and purple; at 5000 feet, on Fernando Po, Dec. 1860." (392) *Mann.*

An ally of *C. sylvatica* and *natalensis*, from which its dense corymbose inflorescence distinguishes it, exclusive of other important marks. The leaves are 4 inches broad.

POLYSTACHYA, *Hooker.*

1. P. ENSIFOLIA; caule flexuoso compresso, foliis ensiformibus supremo spica simplici longiore, bracteis subulatis, floribus glabris, sepalis lateralibus triangulis carinatis, labello oblongo lævi hastato: lobis basilaribus linearibus acutis nanis.

"Flowers yellow." Prince's Island (1986) *Barter.*

This has much the habit of *Epidendrum armeniacum* (Pöppig's *Encyclia macrostachya*), except that the spike is shorter and thinner. I do not find the usual pulverulent surface upon the face of the labellum.

2. P. BIFIDA; caule stricto gracili, foliis ensiformibus acute bifidis, racemo simplici laxo glabro paucifloro, sepalis obtusis, petalis linearibus, labello sessili carnoso angusto obtuse trifido concavo pulvinare basilari oblongo apice unituberculato.

"Epiphyte, 4000 feet, Fernando Po, Dec. 1860." (649) *Mann.*

This too has the habit of *Epidendrum armeniacum.* From *P. ensifolia* it differs in its much narrower sharply bifid leaves, its loose raceme, blunt sepals, and wholly dissimilar lip, the cushion of which is furnished at the point with a distinct downy tubercle.

3. P. LAXIFLORA; foliis oblongis basi angustatis, panicula patentissima racemosa pubescente, sepalis pubescentibus petalisque linearibus acutis, labello brevi unguiculato lamina rotunda cordata acute tridentata pulvinare lineari secus unguem.

"Epiphyte, a foot high, Fernando Po, June 1860." (437) *Mann.*—"Flowers pale yellow. On Mangroves. R. Nun." (2126) *Barter.*

This is one of the larger species, with spreading panicles of racemose flowers, in which respect it greatly resembles *P. puberula.* Its flowers are more than twice as large, and the lip has a long

narrow unguis, to the middle of which the cushion is confined; the lamina of the lip too is nearly circular, with three short sharp teeth. The fruit is 1½″ long, clavate, with projecting ribs. It flowered in May 1861 in the Royal Botanic Garden, Kew.

4. **P. ODORATA**; foliis oblongo-lanceolatis membranaceis, spica paniculata pubescente ramulosa, bracteis subulatis, sepalis setaceo-apiculatis, labello cuneato trilobo unguiculato: lobis lateralibus falcatis obtusis intermedio rotundato, ungue carinato farinaceo.

"Flowers white, fragrant." Onitscha. (1483) *Barter*.—Fernando Po, June 1860. (436) *Mann*.

Differs from *P. ramulosa* in its larger downy flowers and in the form of the lip; from *P. puberula* also in the form of the lip; and from both in having a deep keel in the middle of the unguis.

5. **P. TESSELLATA**; foliis oblongo-lanceolatis pergameneis panicula stricta decomposita glabriuscula gracili ramulosa multo brevioribus, bracteis subulatis, sepalis acutis, labello cuneato unguiculato trilobo: lobis lateralibus falcatis obtusis intermedio subrhombeo emarginato ungue pubescente semicarinato.

"Mouth of the Nun River, left bank, Aug. 1860." (—) *Mann*. Also "from the Cameroons," *Id.*; but no specimen from that locality has been seen by me.

This is much like a very large form of *P. odorata*, and possibly may hereafter prove to be nothing more. It is, however, a much stouter plant, with thicker and blunter leaves, and a tall erect cane-like stem with tier upon tier of fascicles of many-flowered dense spikes; there is little pubescence on the flowers, which are smaller and appear as if tessellated when viewed by transmitted light; the middle lobe of the lip is rather different in form, and the keel in the middle of the unguis is shorter and more undefined.

6. **P. PYRAMIDALIS**; foliis lanceolatis acuminatissimis, spica composita pyramidali densissima puberula, bracteis cucullatis acutis, sepalis acutis glabriusculis, petalis linearibus, labello cuneato plano sessili obtuso apiculato basi utrinque unidentato tota facie pulverulenta.

"Epiphyte. Calyx and corolla yellow. Banks of the Nun River, Sept. 1860." (522) *Mann*.

A very striking plant, more than 1½ foot high, with flat firm 3–5-ribbed leaves from 4 to 5 inches long. The spikes are short, dense, from 2 to 5 forming a pyramidal inflorescence.

7. **P. SETIFERA**; foliis oblongis acutis membranaceis supremo elongato spathaceo angustiore, spica subcomposita bracteis setaceis, floribus

pubescentibus, sepalis setaceo-aristatis, labello ovato acuminato membranaceo nudo utrinque unidentato.

"Flowers dull purple." Prince's Island. (1984) *Barter.*

Very distinct in the long setaceous points of the sepals and the thin ovate lip.

8. P.? ALPINA; subacaulis, foliis linearibus obtusis emarginatis, pedunculo hispido unifloro, flore glabro longe pileato, sepalis acutis dorsali concavo, petalis linearibus acutis, labello longe unguiculato rotundato apiculato basi appendice carnoso 6-lobo aucto unguis marginibus inflexis ciliatis.

"Epiphyte, at 6000 feet, Fernando Po, Dec. 1860." (647) *Mann.*

The pollen of this little plant being unknown, it may be doubted whether it belongs to the genus *Polystachya*, especially since it has not the cushion characteristic of all the other certain species, but in its place a remarkably fleshy 6-lobed flat round process. It has, however, the habit of *Polystachya capensis* of Sonder (*P. Ottoniana*, Rchb. f.). I have only seen two specimens, each a few inches high, bearing one dark-red flower, with similarly red carinate bracts.

9. P. ELASTICA; foliis lineari-lanceolatis apice obliquis scapo subæqualibus, spatha membranacea convoluta pedunculo breviore, spica simplici hirta 8–10-flora stricta bracteis cucullatis apiculatis recurvis, floribus glaberrimis longe pileatis, sepalis apiculatis, petalis obovatis, labello elastice resiliente unguiculato mesochilio rhombeo medio pulvinato epichilio incurvo cochleato ungue lineari carina truncata acuta aucto.

"Epiphyte. River Bagroo, April 1861." (902) *Mann.*

Only one specimen of this curious plant has come home. It is 6 inches high, with flowers about ½ inch long, and throws out a large mass of the thin flat roots that are so common among the leafless Angrecs. Its labellum, which is a long narrow yellow body with an inflexed concave terminal lobe, is thrown back with force when the flower expands, so as to hang down over the pileus formed by the united lateral sepals. By what mechanical contrivance this is effected I have been unable to determine.

EULOPHIA, *R. Brown.*

1. E. GUINEENSIS, *Lindl. in Bot. Reg.* t. 686.

"Very ornamental. Flower-stem above 3 ft. high. Sepals chocolate. Labellum light red, with darker lines." Shady rocks; Nupe. (1485) *Barter.*

Much larger in all its parts than the garden plant. It is certain that Achille Richard's *Saccolabium abyssinicum* is the same; the species has therefore an unusually extensive range.

2. E. LURIDA, *Lindl. Gen. et Sp. Orch.* p. 182; *Bot. Reg.* t. 1821.
"Flowers brownish." Brass. (2040) *Barter.*

Exactly the same as the garden plant.

3. E. LONGICOLLIS; foliis . . . , scapo subpaniculato bivaginato, bracteis minimis, pedicellis capillaribus, ovario acuminato, sepalis petalisque lineari-oblongis, labello saccato trilobo calvo laciniis lateralibus semiovatis divaricatis intermedio subrotundo multo brevioribus.
"On *Phœnix spinosa*;" R. Nun. (2121) *Barter.*

Nearly related to *Eulophia lurida*, with a similar pseudobulb clothed with coarse fibres. Scape 6 inches high, with a sheath at the base and a long flattish scale in the middle. Inflorescence as long, with a long narrow membranous bract at the base of each branch. Flowers the size of *E. lurida.* The leaves of this are unknown.

4. E. LUTEA; foliis . . . , scapo 4-vaginato, racemo simplici, bracteis setaceis pedicellorum longitudine, sepalis petalisque linearibus subæqualibus clausis (?), labello trilobo laciniis lateralibus obtusis subdentatis intermedia spathulata tuberculata breviore calcare recto elongato-conico, columna duplo breviore, anthera mutica.
"Flowers yellow. Grassy valleys, Nupe." (1480) *Barter.*

Leaves unknown. Scapes slender, a foot high. Racemes narrow, many-flowered. Flowers the smallest in the genus, apparently pendulous. The tubercles of the middle lobe of the lip are in about three rows; the uppermost are stalked, the lowest gradually change into minute elevations a little below the isthmus.

5. E. VIRILIS; foliis . . . , scapo 3-fido ad basin ramorum vaginato, bracteis setaceis deciduis, sepalis petalisque linearibus obtusis æqualibus, labello trilobo ante ostium bidentato: laciniis lateralibus triangulis intermedio cuneato-rotundato emarginato calcare cylindraceo labello adpresso, columna nana baseos lateribus prominulis pubescentibus.
"Epiphyte. Flowers yellowish red. Ambas Bay, Febr. 1861." (782) *Mann.*

A small-flowered species allied to *E. lutea, longicollis,* and *tristis*; the spur, stiff and rising upwards till it becomes parallel with the ascending lip, is remarkable. Pollen-masses not seen.

GALEANDRA, *Lindley.*

1. G. GRACILIS, *Lindl. Gen. & Sp. Orch.* p. 187.—G. extinctoria, *Ib.*
"Growing on the ground. R. Bagroo, April 1861." (903) *Mann.*

Exactly like our garden plant. *G. extinctoria* was described from an imperfect specimen, and must be cancelled.

2. [G. LONGIBRACTEATA; scapo valido medio vaginato, racemo laxo multifloro, bracteis linearibus acuminatis ovario æqualibus, sepalis petalisque lanceolatis secundis, labello trilobo basi verrucis 2 oblongis parallelis aucto: laciniis rotundatis lateralibus planis intermedia crispa venis quinque cristatis una parva adjecta utrinque ad isthmum.
Sierra Leone, *Whitfield.*

Leaves unknown. Stem 2 feet high. Near *Galeandra euglossa,* Rchb. f., the lip of which has acute lobes, and neither warts nor crested veins.]

LISSOCHILUS, *R. Br.*

1. L. LONGIFOLIUS, *Bentham in Niger Flora,* p. 530.
"Flowers yellow. Stems 6 feet high, with a spongy creeping rhizome. Swamps, Nupe. (1486) *Barter.* Also Grand Bassà, *Ansell.*

2. L. ROSEUS, *Lindl. in Bot. Reg.* 1843, *Misc.* 37; 1844, t. 12.
"Seven feet high, with pseudobulbous roots. Flowers reddish purple. Base of labellum streaked with orange." Margin of a swampy ravine, Loin Nupe, (1481; also 80 with no locality) *Barter*; side of a rivulet near Pare, (3429) *Id.*

3. L. ARENARIUS; foliis hysteranthiis anguste ensiformibus, scapo gracili laxe vaginato, bracteis setaceo-acuminatis ovario brevioribus, sepalis lanceolatis acutis carinatis reflexis, petalis subrotundis membranaceis, labello subquadrato medio constricto sacco supra basin conico, lamellis 2 cuneatis ad ostium sacci linea elevata interjecta.
"Flowers purple. Base of labellum lined with orange. Flower-stems appear after the first rains, in April; leaves later. Tuber large and flattened." Savannahs in a sandy soil, abundant. (1488) *Barter.*

A noble species, with the stature and appearance of *Bletia verecunda.* Petals full $\frac{3}{4}$ inch long.

4. L. PURPURATUS; foliis hysteranthiis, scapo stricto multifloro, bracteis setaceo-acuminatis ovarii longitudine patentissimis, sepalis oblongis acutis, petalis conformibus obtusis, labelli hypochilio rotundo epichilio angustiore repando undulato calcare brevi conico: lineis 3 tuberculatis lateralibus basi appendiculatis, anthera apiculata.
"Terrestrial; flower-spikes 3 to 4 feet high, appearing before the leaves.

Lip purple, other parts rose-colour. Tubers like kidney potatoes, in chains nearly a yard long; common about Abbeokuta." (3331) *Barter.*

A fine species, readily known by the two great processes standing on either side of the orifice of its little conical spur and terminating the two sides of three glandular lines.

CYMBIDIUM, *Swartz.*

1. **C. ADENOGLOSSUM**; foliis hysteranthiis, scapi vaginis 3 ventricosis obtusis, racemo paucifloro bracteis angustissimis linearibus, sepalis secundis basi productis cornutis petalisque minoribus lanceolatis acuminatis, labello trilobo medio carnoso striato: lobis lateralibus cuneiformibus intermedio ovato apiculato rugoso per axin serie duplici tuberculatis, columna elongata semitereti, anthera cristata.

"Nupe, 1859," *Barter.*

Nearly related to the Cape *Cymbidium tabulare*, from which its ventricose stem-sheaths and very different lip abundantly distinguish it. The two lamellæ usually found in the axis of the lip of this genus, when strictly limited, are here confluent into a raised striated ridge.

ANGRÆCUM, *Thouars.*

1. **A. SUBULATUM**, *Lindl. in Comp. Bot. Mag.* ii. 205.

"On Mangroves. R. Nun." (2125) *Barter.*

The leaves are much stouter than in the cultivated plant. Very near the *A. ornithorhynchum* of Brazil.

2. A.? sp.

"R. Nun." Label lost. *Barter.*

A plant with the distichous leaves of some Dendrobium, and small few-flowered axillary spikes. All the flowers fallen.

There is another plant in the collection also without flowers ("On Mangroves, R. Nun," 2106, *Barter*) which seems to belong to this genus. And Mann sends a third, equally indeterminable (Nun, 524).

3. **A. PELLUCIDUM**, *Lindl. in Bot. Reg.* 1844, t. 2.

"Epiphytal. Flowers yellowish white. Labellum, shining as if frosted. Brass." (37) *Barter.*—"Onitscha," (1757) *Barter*, appears to be the same in fruit.

4. **A. VESICATUM**, *Lindl. in Bot. Reg.* 1843, *Misc.* 9; folio angusto acuminato inæqualiter bilobo, spica pauciflora vaginis bracteisque membranaceis ochreatis, sepalis ovatis cuspidatis petalisque multo minoribus conformibus carnosis, labello lineari-acuminato convexo calcare incurvo

apice maximo vesicato (columna nana, anthera truncata, polliniis caudiculisque *A. pellucidi*).

"Plant of small growth. Flowers pale yellow. Assaba." (1839) *Barter.*

Flowers very fleshy. The column is short and square, like that of *A. eburneum*; but the pollen-masses and caudicles are those of *A. pellucidum.*

5. A. **TRIDENS**; subacaulis, foliis lineari-lanceolatis obtusis apice obliquis, scapo ascendente capillari distanter vaginato, racemo 3–7-floro erecto, bracteis membranaceis cucullatis, sepalis acutis dorsali recurvo, petalis ovatis acuminatis, labello concavo tripartito laciniis filiformibus, calcare pendulo apice vesicato.

"Epiphyte. Fernando Po, 4000 feet, December 1860." (646) *Mann.*

A small species, with the aspect of a lax-flowered Bolbophyll. Caudicles 2, cuneate, downy. Near *A. vesicatum.*

6. A. **VAGANS**; foliis oblongo-lanceolatis setaceo-apiculatis, racemis gracilibus multifloris bracteis obsoletis, floribus carnosis, sepalis petalis labelloque conformibus oblongis obtusis, calcare clavato incurvo labello longiore (caudicula lineari didyma).

"Flowers yellow, insignificant. Resembles a gigantic *Vanda*, and covers many of the small islets near the shore. Prince's Island." (1988) *Barter.*

Leaves 8 inches long, 1¾ broad, not very thick. Racemes drooping. The flowers are the size of those of *A. vesicatum*, and very fleshy.

7. A. **PERTUSUM**, *Lindl. in Comp. Bot. Mag.* ii. 205.

"Flowers white. Brass." (1826) *Barter.*—R. Nun. (—) *Mann.*

The lip of this species varies in being rounded and nearly entire as here, or somewhat acuminate as in the plant first described by me, or truncate and 3-toothed as in what I wrongly distinguished under the name of *A. Pescatoreanum* (Journ. of Hort. Soc. iv. p. 263). In the latter plant the caudicles were certainly not cup-shaped; and therefore I hesitate to adopt Prof. Reichenbach's genus *Listrostachys.* If *Angræcum* is to be broken up, which seems to me quite unadvisable, the structure of the pollen-apparatus must be more exactly ascertained than is possible in dried specimens.

8. A. **MONODON**, *Lindl. in Paxton's Flower Garden*, ii. p. 102. no. 373. ic. xyl. 187.

"Flowers pale yellow, insignificant. Forests between Otta and Abbeokuta, 1859." (3352) *Barter.*

The solitary specimen is very imperfect, but seems to belong to this species.

9. A. ARCUATUM, *Lindl. in Companion to Botanical Magazine*, ii. 204; *Paxton's Fl. Garden*, ii. 120. no. 396. ic. xyl. 199.
"Epiphyte. Calyx and corolla white. Banks of the Nun, Sept. 1860." (521) *Mann.*

This differs in no respect from the South African plant, except in being much more luxuriant.

10. A. CAUDATUM, *Lindl. in Bot. Reg.* t. 1844.
"Brass." (1858) *Barter.*

11. A. DISTICHUM, *Lindl. in Bot. Reg.* t. 1781.
Brass." (1854) *Barter.*—"Onitscha." (1862) *Id.*—"Prince's Island." (1992) *Id.*—Banks of the Nun, Sept. 1860. (523) *Mann.*

12. A. INFUNDIBULARE; caule flexuoso, foliis lanceolatis obtuse et oblique bilobis, pedunculis filiformibus unifloris oppositifoliis, sepalis petalisque linearibus acuminatis, labello subrotundo-oblongo basi infundibulari in calcar incurvum filiforme pedunculo duplo longius producto.
"Flowers large, white, and fragrant. Prince's Island." (2005) *Barter.*

A beautiful species, belonging to the same set as *A. gladiifolium*, which it resembles on a large scale. The lip is about 2¼ inches long and broad; from the tip to the point of the spur it measures 6 inches. The sepals and petals are 2¼ inches long.

13. A. ICHNEUMONEUM; caulescens, foliis distichis late loratis coriaceis apice obliquis, spicis longissimis grácilibus recurvis, bracteis membranaceis cucullatis, floribus distantibus, sepalis petalisque acutis calcare clavato stipitato multo brevioribus, labello lineari concavo truncato tridentato.
"Epiphyte. Calyx and corolla white. Banks of the Nun, Sept. 1860." (520) *Mann.*

A very fine species. Leaves 15 inches long, and 2 broad; spikes of the same length. The flowers when unexpanded look very like some Ichneumon fly settled on the inflorescence. The two pollen-masses have each a long smooth acuminate caudicle; and two small plates stand perpendicular on either side of the orifice of the spur.

14. A.? sp. No flowers.
"Prince's Island." (2019) *Barter.*

A *Vanda*-like plant, not unlike *A. caudatum*, with narrow leaves. The capsules are solitary, clavate, angular, much shorter than the recurved linear canaliculate leaves.

15. A. IMBRICATUM; caulescens, foliis coriaceis ovato-oblongis obtusis oblique bilobis, spicis sessilibus densis oblongis multifloris bracteis inferioribus ovatis acutis carinatis imbricatis, floribus carnosis, sepalis petalisque ovatis acutissimis, labello oblongo apiculato cucullato basi infundibulari calcare brevi obtuso uncinato, (caudicula simplici lineari, glandula recurva).

"On trees in dense masses abundant in the lower parts of the river. Flowers white, very fragrant, inconspicuous. On still nights the river resembles a close Orchid-house, in which *Cymbidium sinense* is in flower. Onitscha." (1484) *Barter.*

Leaves about 6 inches long by 1½ broad. Spikes 1½ inch long.

16. A. CAPITATUM; acaule, foliis pergameneis loratis basi canaliculatis apice oblique dentatis, spicis sessilibus capitatis radicalibus, bracteis oblongis membranaceis obtusis, sepalis petalisque oblongo-linearibus obtusis membranaceis, labello concavo obtuso rhombeo margine crenulato calcare pendulo apice inflato ovarii longitudine, (anthera rostrata, caudiculis 2 discretis acuminatis, glandula hippocrepica).

"Flowers pale rose-coloured. Brass." (1857) *Barter.*

The plant out of flower resembles some *Maxillaria,* such as *Baueri.* The capitate inflorescence is very remarkable.

EPIPOGUM, *Gmelin.*

1. E. NUTANS, *Lindl. in Journal of Linnean Society,* i. 177 (Galera nutans, *Blume*).

"Flowers white with purple specks, Ambas Bay, February 1861." (784) *Mann.*

This seems to differ in nothing important from the common Indian form; the two lines of hair on the lip are, however, rudimentary only, and the lip itself is perhaps more fleshy than usual.

VANILLA, *Plumier.*

1. V. AFRICANA; foliis membranaceis anguste ovalibus acuminatis, spicis basi foliosis, labello trilobo infra medium intus carinato cucullato lobis lateralibus rotundatis intermedio ovato acuto ramentis quibusdum ad apicem carinæ.

"On large trees. Brass." (47) *Barter.*

A slender delicate species, formerly cultivated by Loddiges, with whom it flowered in March 1849, when I gave it the present name, under which it was dispersed.

2. V. sp. No flowers.

"Abundant about Angiama." (2134) *Barter.*

I cannot identify the leaves with those of any published species.

3. V. GRANDIFOLIA; folio coriaceo sessili subrotundo-oblongo venis tribus mediis contiguis, spica brevi crassa lignea.

"Epiphyte. Prince's Island." (1981) *Barter*.

Although only a single leaf and flowerless rachis are in the collection, they may be certainly considered evidence of the existence on Prince's Island of a new *Vanilla* of very large size. The leaf is 7 inches long, and 5 inches broad. The remains of the spike are half as long as the leaf, and bore flowers to the base.

NOTIOPHRYS, *Lindl. in Proceedings of Linn. Soc.* vol. i. p. 189.

1. N. GLANDULOSA; foliis ovalibus acutissimis, spica densa bracteis ovatis cucullatis dense glandulosis, floribus glabris, labello obovato cucullato apice lunato recurvo basi ventricoso ubi venæ in furcam apice verrucosam dividuntur.

"Terrestrial. Flowers brownish. Prince's Island." (1952) *Barter*.

This very distinct species exactly agrees with the generic character assigned to the other species. Its habit is quite that of *Goodyera* (Notiophrys) *occulta* of Thouars, but it is a much smaller species.

CORYMBIS, *Thouars*.

1. C. DISTICHA, *Folia Orchidacea sub* Corymbi.

"Herbaceous, 3 to 4 feet high. Flowers white. Fernando Po." (1478) *Barter*; (430) *Mann*.

Prof. Reichenbach ('Bonplandia,' 15 Feb. 1857) has referred to this plant the *Hysteria veratrifolia* of Reinwardt, and *Rhynchanthera paniculata* of Blume's Tabellen, no. 78, the identity of which had been unsuspected in consequence of the erroneous representation of the placenta. Few Orchids have so extensive a range as this, which is found from the Gulf of Guinea to the Feejee Islands, a space of 180 degrees of longitude,—unless, indeed, the genus contains more species than one, as becomes more probable as we acquire better materials. Cuming's plant from the Philippines, for example, seems to be distinct from that of Africa.

PENTHEA, *Lindley*.

1. P. PUMILIO; caule humili laxe vaginato aphyllo 1–2-floro, labello cuneato tridentato, sepalis infra apicem apiculatis petalisque ovalibus obtusis.

"River Bagroo, April 1861." (904) *Mann*.

A very distinct little species, from 2 to 3 inches high. The flowers, which are as large as those of *P. filicornis*, seem to be orange-coloured. There is no trace of leaves.

AMPHORCHIS, *Thouars.*

1. A. OCCIDENTALIS; undique tomentosa, folio unico (variegato) oblongo acuto basi cucullato, scapo bivaginato, spica elongata multiflora, petalis glabris truncatis 2–3-dentatis, labello cuneato apice 3-dentato supra carinato, calcare filiformi subclavato dorsali supra labellum curvato.

"Flowers orange. Leaves marked like *Anæctochilus.* But one specimen seen, in a ravine near Jeba Nupe." (1487) *Barter.*

This species confirms Prof. Blume's opinion (Mus. Lugd. Bot. ii. 190) that the genus *Amphorchis* should be distinguished from *Cynorchis.* Its peculiar character consists in the anther being inverted (not horizontal) as in so many Cape Orchids. The plant now described looks like a tomentose state of *Amphorchis calcarata,* but is totally different in its petals, lip, and spur.

HABENARIA, *W.*

1. H. PALUDOSA; (§ petalis labelloque integerrimis) caule gracili stricto subbifloro folioso, folio infimo lanceolato cucullato superioribus 4 distantibus sensim angustatis setaceo-acuminatis, bracteis cucullatis, sepalis lineari-lanceolatis supremo c. petalis conformibus galeatis, labello lineari-spathulato calcare lineari sepalis longiore, (anthera apiculata basibus loculorum clavatis truncatis breviore, appendice laterali setacea, processibus ovatis, rostello parvo subulato libero).

"Terrestrial. Flowers deep orange. Swamps." Loin Nupe. (1479) *Barter.*

The habit of this is the same as that of *Bonatea pratensis,* to which genus it would be referred, if the genus *Bonatea* could be retained, which is certainly not the case. The stem is from a foot to 14 inches high.

2. H. STENOCHILA; (§ petalis labelloque integerrimis) caule folioso, foliis 5 oblongo-lanceolatis setaceo-acuminatis in bracteis ovario longioribus transeuntibus, spica oblonga multiflora, sepalis lateralibus semiovatis obtusis dorsali petalisque ovato-linearibus multo majoribus, labello lineari, calcare filiformi arcuato ovario duplo longiore apice bidentato, (antheræ basibus angustis ascendentibus, appendice laterali obsoleta, processibus filiformibus elongatis).

"Flowers white, fragrant. Prince's Island." (1995) *Barter.*

Near *H. candida,* but the leaves are broader, the petals and lip very much narrower, and the tip of the spur is not bidentate as in that species.

3. H. MACRANDRA; (§ petalis indivisis, labelli tripartiti laciniis lateralibus setaceis) foliis lanceolatis acutissimis petiolatis caule duplo

brevioribus, vaginis 4 sessilibus lanceolatis inferiore foliacea, racemo laxo 2- plurifloro, bracteis foliaceis acutissimis ovario longioribus, sepalis patentissimis linearibus acuminatis calcare clavato ascendente brevioribus, petalis e lata basi setaceis indivisis, labelli tripartiti laciniis omnibus setaceis, anthera lineari apiculata sepalo dorsali parum breviore.

"Herbaceous plant, 2 feet high; calyx and corolla white and green. Banks of Bonny R., Oct. 1860." (518) *Mann.*

Leaves about 8 inches long, like those of a *Prescottia.* Scape from 7 to 9 inches high, excluding the flowers, which vary in number from two to ten. Sepals rather more than an inch long; spur 3 inches. The whole aspect of the flower is that of a *Bonatea,* without, however, the apparatus of that subgenus. The anther is very nearly as long as the dorsal sepal, a circumstance previously unknown in the genus.

4. H. PRÆALTA, *Lindl. Gen. & Sp. Orch.* p. 321.—Satyrium præaltum, *Thouars, Orch. Afr.* t. 11.

"Top of Clarence Peak, Fernando Po, at 10,000 feet, Dec. 1860." (645) *Mann.*

This does not appear to differ from the Bourbon plant, as far as can be judged from the figure and from a bad specimen given me by the late Achille Richard. One of Mann's two specimens is 2 feet high, the other not quite 5 inches.

Notes on *Coutoubea volubilis*, Mart., and some other Gentianeæ of Tropical America. By Dr. A. H. R. GRISEBACH, F.M.L.S.

[Read Nov. 7, 1861.]

IN the later set of Mr. Wright's Cuba-plants there occurs a twining herbaceous Gentianea, which agrees (though not in all particulars of its description) with *Coutoubea volubilis*, Mart., or at least is its congener, and may be referred to it, till the comparison of authentic specimens shall settle the question whether it be specifically different: the chief discrepancy, viz. a simple raceme, in Dr. von Martius's description may be accidental. From the structure of the flower, however, the 5-partite calyx, and chiefly from the peculiar stigma and singular habit, it is evidently no true *Coutoubea,* but must form a new genus, to which (*Goeppertia*, Nees, in Laurineæ, proving identical with *Aydendron*) I wish to transfer that vacant name, as an acknowledgment due to the deserving Silesian botanist. The systematical place of *Goeppertia* would be next to *Coutoubea,* which in a certain degree it connects with

Erythræa. Its inflorescence is so far interesting, as it tends to show that the true spikes or racemes of *Coutoubea* are to be regarded as composed of cymes, reduced to a single flower, thus passing into the typical cymose inflorescence of *Gentianeæ.*

GOEPPERTIA, nov. gen.

Calyx 5-partitus, 2-bracteolatus. Corolla infundibuliformis, marcescens: limbo 5-partito. Stamina 5, e tubo corollæ exserta: filamentis brevibus infra faucem insertis: antheris erectis oblongis immutatis. Ovarium 1-loculare: stylo deciduo, stigmate indiviso ovoideo, basi in marginem prominulum producto. Capsula 2-valvis, septicida, valvulis paullo introflexis: semina reticulata, marginalia, funiculis dentiformibus inserta. Herba volubilis: folia lanceolata, paribus plerisque distantibus: cymæ 3-fidæ v. 3-chotomæ, in racemum elongatum dispositæ (aut sec. Mart., racemus simplex, terminalis).

G. VOLUBILIS, *Gr.* Syn. *Coutoubea,* Mart. Caulis pluripedalis, tenuis, teretiusculus, superne ramosus, internodiis mediis 3″ longis; folia 1″ longa, 2‴ fere lata, acuminata, basi contracta vaginantia, uninervia, obscure venosa, margine sæpe revoluta; axis inflorescentiæ 6–10″, internodia ejus 1–1½″ longa, cymis pedunculum, calycibus pedicellum, subæquantibus, bracteis bracteolisque linearibus, his brevioribus; calyx bracteolis multo longior; segmentis lanceolatis, acuminatis, apice recurvis, margine membranaceis, tubo corollæ parum superatis; corolla habitu Erythrææ, "ochroleuca" (Mart.), fere ad medium divisa: tubo 2‴ longo, lobis dextrorsum contortis, elliptico-oblongis, obtusis, anthera duplo longioribus; capsula ovoidea, 2‴ longa.

Hab. In Cuba orientali (*Wright,* No. 1372); *C. volubilis* in Haïti (*Bertero*).

Mr. Bentham (Hook. Journ. of Bot. vi. p. 193) has published some emendations to my arrangement of *Gentianeæ,* and, while generally approving of his views, I take this opportunity to add a few observations. In *Coutoubea* Mr. Bentham follows Kunth in regarding *C. spicata,* Aubl., as *C. densiflora,* Mart. Indifferent figures of old authors will often remain doubtful, but in this case I still believe that Martius was quite right in separating his species; for in Aublet's figure the flowers are much more distant, and the leaves not contracted at the base, while in his description I find nothing which would not apply to the plant I have described under his name. Now, as my own *C. spicata* proves to be identical with *C. reflexa,* Benth., of which I now compare specimens from Guiana (R. Schomb. no. 1060) and from Bogota (*C. spicata* in Goudot's Coll.), it is evident that there is no difference in Mr.

Bentham's views on the species to be distinguished, but merely in the interpretation of Aublet's figure. In Lamarck's Illustration there is a confusion between *C. spicata* and *C. ramosa*; for his figure (t. 79) designated *C. alba*, which is a translation of Aublet's French name of his *C. spicata*, belongs to *C. ramosa*, Aubl.; but, bad as it is, this figure was by mistake quoted in the 'Prodromus' under both species.

The genus *Apophragma* I established (as was indeed not advisable) from Aublet's description and figure (t. 26. f. 2, 9, 10), exhibiting exserted stamens and a "stigmate à deux lames larges et aigues:" at the time of its publication I wanted sufficient materials to verify this structure. But as the habit is exactly the same as in the common plant designated *Schübleria tenuifolia*, Don, (Benth.!), and identical with my own specimens of *Apophragma*, Aublet's analysis is probably erroneous: hence Bentham correctly reduced *Apophragma* to *Schübleria*. In his paper there are, however, several errors (partly typographical ones) with regard to Aublet's figures. I had not taken, as he presumed, the characters of *Apophragma* from t. 26. f. 4–7, which belong to *Schultesia*, but from f. 9, 10 (both correctly quoted by Aublet), and the "appendiculate filaments" occur in Aublet's description: f. 1, again, or *Exacum guianense*, is *Schultesia*; f. 2, *E. tenuifolium*, or *Schübleria* (Benth.).

Reichertia was separated by Karsten from *Schultesia* on account of its bidentate filaments: such a structure exists in *Sch. stenophylla* itself, the first-published species of the genus, and is evidently of no generic importance.

Erythræa, *Cicendia*, *Microcala*, *Xestæa*, and *Orthostemon* are mere artificial distinctions. From its twisted anthers, *Erythræa* might be preserved, as it is; though *E. quitensis*, Kth., during anthesis, is devoid of torsion, or shows only a single slight anfractuosity, but it is more or less twisted in the dry state afterwards. The knowledge of the species of *Erythræa*, chiefly of the American ones, is now less satisfactorily settled than at the time of my publication. Its later edition, contained in DeCandolle's 'Prodromus,' the proofs of which could not be corrected by myself, is often obscured by misprints, which may usually be improved by comparison with my monograph and the article on *Gentianeæ* in Hooker's Fl. Bor.-Amer. For instance, there was no *E. tenuifolia*, Gr., in my manuscript, this name belonging, as var. γ, to the preceding *E. linarifolia*, as was to be seen from the form of its diagnosis, though overlooked by subsequent authors. Dr. Schlechtendal (Bot. Zeit. xiii. p. 915) has republished, from a Mexican periodical, Schiede's paper on two Mexican *Erythrææ*, and he describes a third considered as new by Schaffner: of these I possess two collected by Schaffner. His no. 15 (agreeing with *E. divaricata*, Schaffn.) is nothing but a broad-leaved form of the common *E. quitensis*, Kth., a species ranging from the coast of Northern Mexico (Ervendberg, no. 186!) through the mountains of Guatemala (Wendl.!) and Costa Rica (Oerst.!): the original, lower form, with narrower leaves, was collected likewise in Guatemala (Wendl.!), and grows besides in Venezuela (Moritz!) and Quito (Jameson!). In the diagnosis of *E. tetramera*, Schiede, I find nothing which would prevent me from referring it to *E. quitensis*. The second species sent by Schaffner (no. 13), or *E. stricta*, Schiede, agrees with the description of *E. floribunda*, Benth. My *E. Mühlenbergii* was confined by Asa Gray to a species ranging from California to New Mexico, while he reduces the Pennsylvanian plant to the *E. ramosissima*, Pers., which he declares identical with the doubtful *Exacum pulchellum*, Pursh: this is undoubtedly a correct emendation, as Mr. Marsh found the true European species even as far south as Jamaica (probably introduced along the Atlantic with foreign grain). Among the doubtful *Erythrææ*, *E. elodes*, R. S., upon Godron's authority, is *Elodes palustris*; and to *E. Massoni*, Linn. (from an Azoric specimen) may be reduced *E. diffusa*, Woods, which is apparently indeed perennial, as stated by Lejolis, though contradicted by Grenier.

The distinction of the four remaining genera is more questionable, and I should now rather prefer regarding *Microcala* as a section of *Cicendia*; for an intermediate group of species (*Stenocala*) would be formed by *C. exaltata* and by a new Guatemalan species, discovered by Mr. Wendland, as appears from the following review of the genus.

CICENDIA.

Sect. 1. *Hippocentaurea*, Reichenb. Calyx 4–5-partitus.

1. *C. pusilla*, Gr. (Syn. *C. Candollei*, Gr.)
2. *C. Poeppigii*, Gr.
3. *C. fastigiata*, Gr.

Sect. 2. *Stenocala*. Calyx ad medium 4-fidus.

4. *C. exaltata*, Gr.
5. C. STRICTA, Gr. (n. sp.); caule gracili in pedunculas strictas sæpe unilaterales diviso, foliis inferioribus spathulato-lanceolatis obtusiusculis, superioribus linearibus decrescentibus, calycis lobis ovato-

lanceolatis acutis tubum ovatum æquantibus, corollæ "rubellæ" tubo exserto tenui lobis obovato-oblongis longiore, capsula ovoideo-oblonga, uniloculari: placentis intus non prominulis.

Herba spithamea, annua; folia inferiora 8‴ longa, 2‴ lata, internodiis longiora, superiora distantia, internodiis crescentibus ultrapollicaribus; pedunculi sæpe æquilongi cymam racemiformem a medio caule constituentes; calyx 1½‴, corollæ tubus 3‴ longus; antheræ ovales, incumbentes, paullo exsertæ, filamento tenui; stylus ovario brevior, stigmate late capitato; capsula 3‴ longa.

Hab. In Guatemala, pr. Las Nubes (*Wendl.*, mense Januar.); forma minus elongata in vulcano Frasu, Costaricæ, alt. 9000 ped. (*Wendl.*, m. April.).

Sect. 3. *Microcala*, Lk. Calyx 4-dentatus.

6. *C. filiformis*, Reichenb.
7. *C. quadrangularis*, Gr.

Of *Lisianthus*, sect. *Brachycodon*, Benth., I possess his *L. pumilus*, which proves a congener of *Pagæa*; and probably *L. ramosissimus*, Benth., is *P. Poeppigii* itself. Mr. Bentham observed the anthers to be at length recurved: hence there remain, to distinguish it from *Lisianthus*, the higher insertion of the stamens, the form of the corolla, and the very different habit. In the true *Lisianthi*, the enlargement of the connective on the back of the anther-cells is peculiar; and this character, if compared throughout the genus, may perhaps be of some value in the discrimination of *Pagæa*. In the section *Helia* (viz. in *L. brevifolius* and *L. chelonoides*), the structure of the anthers is the same as in *Chelonanthus* and *Macrocarpæa*: in both species they are at length recurved, and in the former the connective is apiculate: hence the character of *Helia* is chiefly confined to a marcescent corolla, and less peculiar than was supposed. A double placenta in each capsule-cell occurs likewise in *L. chelonoides* (a really annual species, from Kegel's specimens) and in *L. alatus*, Aubl., to which I reduce my *L. Oerstedii*. If this identification proves correct, Aublet's species must be transposed to *Helia*. *L. tetragonus* and *L. auriculatus*, Benth., have been reduced by their author to *L. acutangulus*, Bot. Mag., which is *L. trifidus*, Kth., but not *L. fistulosus*, Poir., the latter, from an authentic specimen, having purple flowers.

The sections *Chelonanthus* and *Macrocarpæa* are to be united, being only distinguished by the shrubby growth of the latter: the shape of the capsule proves of no sectional importance.

My supposition that *Symbolanthus* is little distinguished from the section *Leiothamnus* is confirmed by a beautiful *Lisianthus* collected by Mr. Wendland in Central America, the rosy-violet flowers of which are four or five inches long. The structure of its ovary is the same as in *Lisianthus* (ovarium biloculare, placenta laminata utrinque duplici); but the plant is anomalous in the genus by having the large hypogynous ring of *Tachia*. Except in the larger size of flowers (but not so much as, from a misprint in its description, it would appear), this shrub agrees sufficiently with the figure of *L. calygonus*, R. P., or is at least nearly allied to this and to *L. daturoides*.

Petasostylis is an artificial genus, chiefly distinguished from *Leianthus* by a two-celled capsule. Both species, collected again by Mr. Wendland (*P. saponarioides* in Costa Rica, *P. nigrescens* in Guatemala), are variable in the size of the flowers: the corolla of both is often two inches long, and the lobes (much too long in the figure of Bot. Mag. t. 4043) only 3–4‴, as described by Schlechtendal.

In Eastern Cuba a remarkable new *Lisianthea* was discovered by Mr. Wright (no. 1346), which, though my materials do not allow the dissection of more than two flowers and a single fruit, may be regarded as a link between *Lisianthus*, of which it has the anthers, and *Leianthus umbellatus*, which it approaches by its axillary peduncles and prominulous leaf-sheaths.

ZONANTHUS, nov. gen.

Involucrum calycem cingens, foliolis geminis rotundatis in tubum breviorem connatis, tubo cupuliformi apice intus in marginem annularem integrum productis. Calyx campanulatus, ecarinatus, demum fissilis, 5-lobus, lobis quadrato-subrotundis planis imbricatis margine membranaceis. Corolla hypocraterimorpha, dextrorsum contorta, ad medium fere 5-loba, tubo campanulato, lobis oblongis obtusis. Stamina medio corollæ tubo inserta, filamentis exsertis, antheris incumbenti-recurvis, loculis connectivo dilatato adnatis. Ovarium placentis suturalibus divisis semi-4-loculare, stylo elongato, stigmate 2-lamellato. Capsula septicida, bivalvis, carpidiis 2 introflexis semi-4-locularis, placentis polyspermis marginalibus, testa reticulata. Frutex, foliis spathulato-oblongis petiolatis, petiolis in vaginam annularem connexis; pedunculi axillares, solitarii, folia subæquantes, uniflori; corolla virens.

Z. CUBENSIS, *Gr.* Rami teretiusculi, internodiis brevibus; folia 3–4″ longa, obtusiuscula, arcunervia, in petiola 6–10‴ longa attenuata; pedunculi 3″, calyx 8‴, involucri tubus ei appressus 3–4‴ longus, lobis ejus patulis calycem subæquantibus; corollæ tubus $9'''$, lobi $8'''$ longi, 2–$3'''$ lati; capsula oblongo-lanceolata, glutinoso-nitens, fere sesquipollicaris.

Hab. In montibus S. Cataline Cubæ orientalis.

On *Inocarpus*.[*] By GEORGE BENTHAM, Esq., P.L.S.

[Read Feb. 20, 1862.]

AMONGST the plants sent in 1836 from British Guiana by Sir Robert (then Mr.) Schomburgk were some specimens which, he informed me, were gathered from a most beautiful tree, almost covered with bright-yellow flowers, and called by the natives Etabally, on account of its frequency at the cataracts of that name on the Essequebo. Recognizing in them the general characters of Leguminosæ of the suborder Cæsalpinieæ, but with many differences from all published genera of that group, I described them in Hooker's 'Journal of Botany,' ii. p. 99, as a new genus, under the name of *Etaballia*; and some years afterwards, Dr. Hooker figured it for me in Hooker's 'Icones,' t. 453, 454. At the same time, I found amongst some unnamed specimens from the Isle of St. Vincent's one so closely resembling the *Etaballia* in general foliage, inflorescence, calyx, and petals, that, although I could not then dissect the flowers, I thought I might venture to allude to it as a second species, to which I gave the name of *E. macrophylla*. This, however, proved to be a cultivated specimen of *Inocarpus edulis*; and as that genus had been described with characters totally incompatible with Leguminosæ, and had been referred either to Sapotaceæ or to Hernandieæ, I laid it aside without further examination, vexed at having brought together into one genus plants belonging to such very different orders. Recently, however, Dr. Hooker and myself had occasion to examine *Inocarpus*, of which we have now very complete flowering specimens from the South Pacific Islands, as well as from various tropical botanical gardens; and we found that the received account of the structure of the ovary is in some important respects erroneous, and that the genus is in fact, as it is in appearance, closely allied to *Etaballia*, and must be placed next to it in Leguminosæ, notwithstanding the gamopetalous corolla. The union indeed of the petals at their base, or rather by their claws, is but little more than that which occurs in most Trifoliums, in several Mimoseæ, &c.; the ten monadelphous stamens are such as are frequent in Leguminosæ; and the ovary is characteristic of that order, this being perhaps the only organ by which Leguminosæ can be always recognized through all their varied modifications. In *Etaballia* it consists of a single carpel with a very short terminal but excentric style, and two or three amphitropous ovules with a superior micropyle attached to the upper or inner angle of the cavity, that is, to the side from which the style proceeds. Only one of these ovules comes to maturity; and in one already faded flower I could find only a single ovule, but of the usual form and attachment, and not anatropous nor pendulous from the summit of the cavity, as described by Endlicher. I do not think, however, that this skilful botanist ever examined *Inocarpus* himself. At the time of the publication of his 'Genera,' it was rare in herbaria; and the statement that the ovule was pendulous from the top of the cavity must have been taken from Roxburgh, the only botanist since Rumphius and Forster who has described the plant from actual specimens; and an inspection of the rude and certainly incorrect analysis in the plate of the Coromandel plants (t. 263) probably induced Endlicher to suppose that the ovule must be anatropous. The conversion of the calyx and corolla into an outer calycule and a simple perianth is another proof that Endlicher's character was compiled from books; for an examination of the plant would have shown him that the two lobes of the calyx are not the summits of two united bracts, but formed by the cohesion of the normal five teeth of the calyx into two or sometimes three lobes, as shown by their venation, and sometimes by minute teeth at the apex.

From these incorrect notions of the structure of the flowers which had obtained, it is not to be expected that the place of *Inocarpus* in the natural system could have been accurately fixed. Jussieu, having only Forster's and Thunberg's characters to judge from, referred it to the "genera *Sapotis* affinia;" and, as far as then known, several technical points appeared to connect it with that order. Endlicher, however, studying apparently Roxburgh's figure, sought to connect it with *Hernandia*, in a small group annexed to Thymeleæ; and there more recent authors have left it, raising however the group to an independent order of Monochlamydeæ, under the name of Hernandiaceæ. Even Miquel, in his 'Flora van Nederlandsch Indië,' adopts this view, extracting his characters from Endlicher, although a slight examination of specimens of the two plants, of which he must have had abundance at his disposal, would have shown him that they differed as widely in most of their essential characters as in habit. In the 'Prodromus,' *Inocarpus* is excluded from Sapotaceæ on the authority of Endlicher; and neither that genus nor *Hernandia* is alluded to under Thymeleæ. All these doubts may now be considered as removed by the reference of *Inocarpus* to Leguminosæ; whilst *Hernandia* remains far away amongst unisexual Monochlamydeæ, allied to those Euphorbiaceæ in which the albumen almost or completely disappears.

The so-called nut, but rather the kernel or seed, of *Inocarpus edulis* appears to be extensively eaten in its native country, and more especially in some of the eastern islands of the Indian Archipelago, where it is said to be very abundant. Rumphius says that, when boiled or roasted in ashes, it is sweet like the Spanish eatable acorns, much prized by the natives of several of the islands, and that in Machian they almost live upon it. According to George Forster, it replaces chestnuts in the Society and Friendly Islands; but is less agreeable, although sweetish, and is ill suited to weak stomachs. Roxburgh, who raised the tree in the Botanic Garden of Calcutta, says that the kernel is certainly eatable, but by no means palatable. Like the *Etaballia*, this tree appears to be hard-wooded and of considerable beauty. The flowers are described as of a pale yellow.

According to Rumphius, the tree yields a resinous glutinous juice, into which the Papuans steep the tips of their arrows, giving them a black colour; and this statement is copied by Forster and subsequent writers. There is some doubt, however, whether Rumphius has not confounded two different trees in his article "Gajanum," Herb. Amboin. i. 170, t. 65, universally referred to *Inocarpus* on the authority of Thunberg. The fruit is indeed so described by Rumphius as to leave little doubt as to its identity, but his representation of the flowers does not at all agree with those of *Inocarpus*. They are figured as borne on long pedicels in a short loose raceme; and the petals are lanceolate, not linear. In all our specimens, wild or cultivated, they are either closely sessile, or the pedicel is so short as to be scarcely perceptible even after the fruit is considerably enlarged, although the stipes of the fruit may then, after the calyx has fallen off, answer the appearance of a pedicel. Forster says indeed that the flowers are "brevissime pedicellati," and that the inflorescence is a raceme, and not a spike; but, in the loose sense in which these words were formerly taken, he may mean that the flowers are distant from each other, and not close together. Forster also describes the flowers as occasionally 6-merous, with twelve stamens; but this must have been accidental. We find them always 5-merous, and Roxburgh so describes them.

With regard to *Etaballia*, there are still some points of affinity and nomenclature to clear up. Dr. Sagot, in his active and scientific explorations of French Guiana, found near Karouany a tree supplying a hard wood, called Boco in the country, and which, from this name and from the station, he concludes to be the *Bocoa provacensis* described and figured by Aublet (Pl. Gui. Supp. 38, t. 391), from specimens without flower or fruit. Dr. Sagot's specimens are in fruit, showing with certainty that they belong to Leguminosæ. He had not seen the flowers; but the foliage and inflorescence, of an unusual description in that order, are so nearly those of *Etaballia*, that he suggested that the two might be at least congeners, if not of one and the same species, and in that case Aublet's older name should be preferred. A further comparison, however, throws some doubt even as to their generic identity. In *Etaballia* the ovary is sessile and very villous, and the funiculus exceedingly short. In *Bocoa* the youngest fruits we have are perfectly glabrous and shortly stipitate; the ovules, even those which are not at all enlarged, are borne on a filiform funiculus at least three times as long as themselves; and as the seed enlarges, this funiculus lengthens in a most remarkable manner, folding itself and coiling backwards and forwards round the outside of the seed, so as almost to enclose it. Until therefore we have seen the flowers of *Bocoa* and the fruit of *Etaballia*, it is most prudent to maintain the two genera as distinct.

Again, as to the name *Etaballia*, Sir R. Schomburgk, in his later expeditions, learned that it was not this tree, but a species of *Vochysia*, which the natives named after the cataract. These errors as to native names are so frequent that their use in botanical nomenclature ought to be restricted to very exceptional cases; but, in the present instance, if *Etaballia* does not merge into *Bocoa*, the rule of priority—one of the most important to maintain in botanical nomenclature—would require the retention of that name, notwithstanding the probability of its original incorrectness.

The following are the technical characters of the three genera, independently of those which are common to all Cæsalpinieæ.

1. INOCARPUS. *Forst. Char. Gen.* p. 65, t. 33. Calyx tubuloso-campanulatus, 2- rarius 3-lobus, lobis rotundatis. Petala 5, basi in tubum coalita, supra calycem libera, linearia, subæqualia, imbricata summo intimo, apice corrugato-involuta. Stamina 10, filamentis in tubum corollæ adnatum alte coalitis, alterna longiora; antheræ consimiles,

breves didymæ. Ovarium subsessile. Stylus brevissimus, stigmate oblique dilatato-concavo. Ovula 2–3, rarissime solitaria, amphitropa, subascendentia funiculo brevissimo suturæ appensa. Legumen breviter stipitatum, obovato-incurvum, subdrupaceum, sarcocarpio tenui, endocarpio crasso fibroso, monospermum. Semen late ovatum, funiculo brevissimo turbinato-incrassato affixum. Testa rigide membranacea, reticulato-venosa. Albumen 0. Cotyledones crasso-carnosæ, radicula brevissima supera leviter incurva. "Plumula squamulis minimis imbricatis obtecta."

Arbor excelsa, glabra. Folia simplicia (unifoliolata), brevissime petiolata, ovali-oblonga, penninervia, coriacea. Stipulæ parvæ. Spicæ axillares laxæ. Flores pallide flavi, ad axillas bractearum parvarum sessiles v. subsessiles, bracteolis minutis v. inconspicuis.

Species unica, *I. dulcis*, Forst., in insulis Oceani Pacifici v. Archipelagi Indici spontanea v. culta. Semina edulia. *Gærtn. f. Fruct.* iii. t. 199, et 200. f. 1. *Roxb. Pl. Corom.* iii. t. 263.

2. Etaballia. *Benth. in Hook. Journ. Bot.* ii. 99. Calyx tubulosus, 5-dentatus v. dentibus summis coalitis 4-dentatus. Petala 5, libera v. vix ima bási tubo stamineo coalita, linearia, subæqualia, imbricata summo intimo, apice corrugato-involuta. Stamina 10, hypogyna, alte monadelpha, alterna paullo longiora; antheræ consimiles, breves, didymæ. Ovarium sessile. Stylus cylindricus, stigmate obliquo parum incrassato. Ovula 3–4, amphitropa, funiculis brevissimis appensa. Legumen.......

Arbor pulcherrima, ramis glabris. Folia simplicia (unifoliolata), brevissime petiolata, ovata v. ovato-oblonga, penninervia, coriacea, glabra v. subtus puberula. Stipulæ parvæ. Spicæ axillares v. terminales, densæ, novellæ bracteis imbricatis lupulinæ. Flores flavi, ad axillas bractearum mox deciduarum solitarii, sessiles, bibracteolati. Calyx ferrugineus. Ovarium villosum.

Species unica Guianensis. *Hook. Ic. Pl.* t. 453, 454.

3. Bocoa. *Aubl. Pl. Gui.* t. 391. Calyx tubulosus?, deciduus. Petala... Stamina...... Ovarium breviter stipitatum? ovulis paucis funiculo longo appensis. Legumen (parvum) breviter stipitatum, oblique ovato-subfalcatum, coriaceum, bivalve. Semen unicum, funiculo longissimo filiformi contortuplicato ad hilum turbinato-incrassato semen extus pluries circumdante; albumen 0; cotyledones crassiusculæ; radicula brevissima.

Arbor glaberrima ligno durissimo. Folia simplicia (unifoliolata), breviter petiolata, ovata, penninervia, coriacea, nitida. Stipulæ parvæ v. inconspicuæ. Spicæ ad nodos vetustos solitariæ v. fasciculatæ.

Species unica Guianensis. Flores ignoti. Ovarium jam auctum breviter stipitatum, glaberrimum. Semina in speciminibus immatura.

On the Three remarkable Sexual Forms of *Catasetum tridentatum*, an Orchid in the possession of the Linnean Society. By CHARLES DARWIN, M.A., F.R.S., F.L.S.

[Read April 3, 1862.]

THE President and Officers of the Linnean Society having kindly permitted me to examine the remarkable specimen, preserved in spirits in their collection, of an Orchid bearing flowers of two supposed genera, and known sometimes to bear the flowers of a third genus, I have thought that the Society might like to hear a short account and explanation of this singular case. The following details will hereafter appear in a small work on the 'Fertilization of Orchids by Insect-agency,' which I am preparing for early publication.

Botanists were astonished when Sir R. Schomburgk* stated that he had seen three distinct forms, believed to constitute three distinct genera, namely *Catasetum tridentatum*, *Monachanthus viridis*, and *Myanthus barbatus*, all growing on the same plant. Lindley† remarked that "such cases shake to the foundation all our ideas of the stability of genera and species." Sir R. Schomburgk affirms that he has seen hundreds of plants of *C. tridentatum* in Essequibo without ever finding one specimen with seeds‡, but that he was surprised at the gigantic seed-vessels of the *Monachanthus*; and he correctly remarks that here we have traces of sexual difference in Orchideous flowers.

The general appearance of the flower of *Catasetum tridentatum*, in its natural position, is given in the diagram, p. 152 (fig. 1); but the two lower sepals have been cut off. The column is figured separately in an upright position, showing the two curious prolongations of the rostellum, or, as I shall call them, the antennæ.

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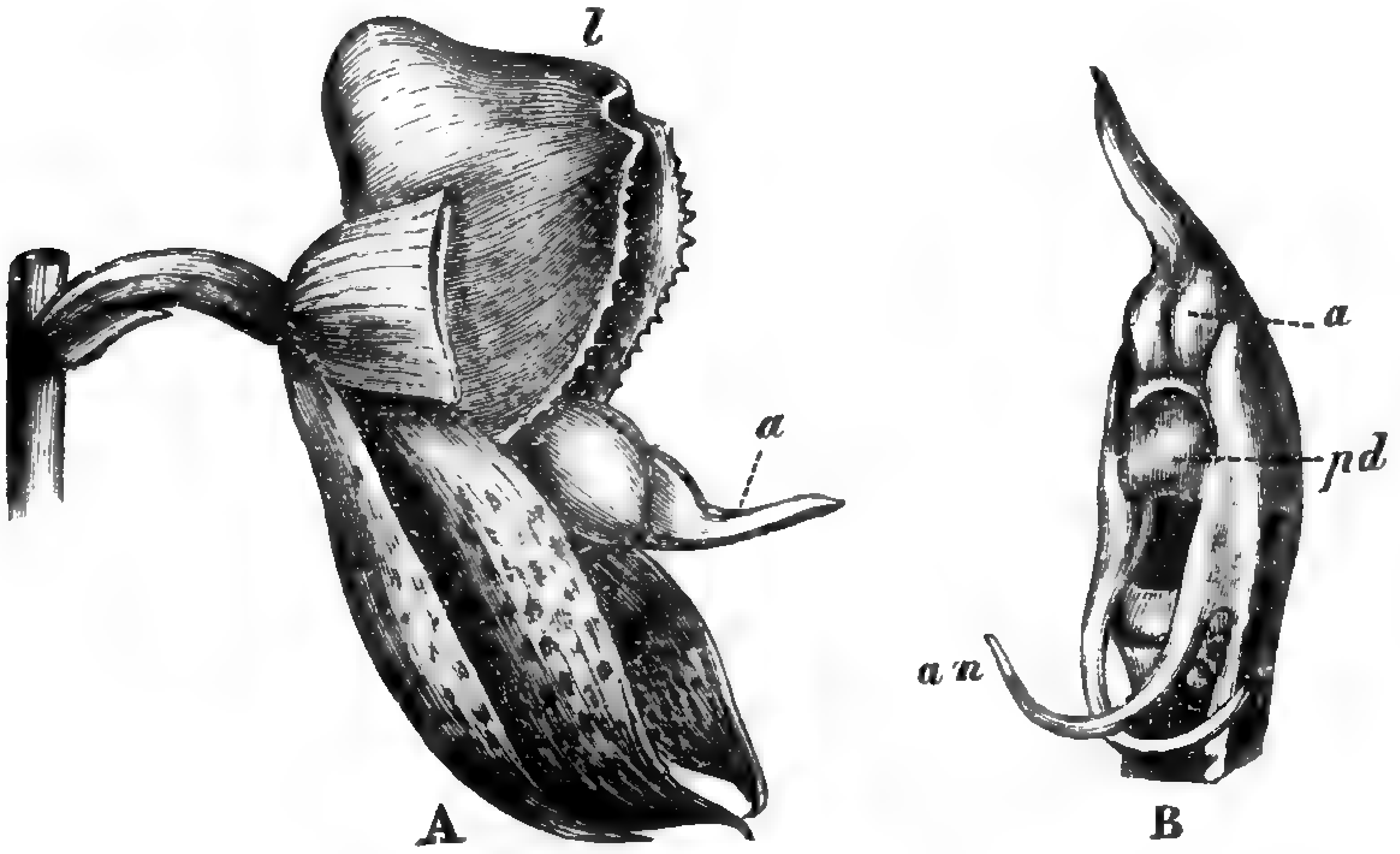
* 'Transactions of the Linnean Society,' vol. xvii. p. 522. Another account, by Dr. Lindley, has appeared in the 'Botanical Register,' vol. xxiii. fol. 1951, of a distinct species of *Myanthus* and *Monachanthus* appearing on the same scape: he alludes also to other cases. Some of the flowers were in an intermediate condition, which is not surprising, seeing that in diœcious plants we sometimes have a partial resumption of the characters of both sexes. Mr. Rogers, of River Hill, informs me that he imported from Demerara a *Myanthus*, but that when it flowered a second time it was metamorphosed into a *Catasetum*. Dr. Carpenter ('Comparative Physiology,' fourth edition, p. 633) alludes to an analogous case which occurred at Bristol.

† 'The Vegetable Kingdom,' 1853, p. 178.

‡ Brongniart states (Bull. de la Soc. Bot. de France, 1855, tom. ii. p. 20) that M. Neumann, a skilful fertilizer of Orchids, could never succeed in fertilizing *Catasetum*.

A deep chamber, which from its homological relations must be called the stigmatic chamber, lies between the bases of the antennæ; and the anther, with its concealed pollen-masses, is seated above. My object is not here to describe in detail the structure of the flower and its curious mechanism. But it must be observed that the ovarium is much shorter, thinner, less deeply furrowed, more solid in the centre, and the bract at its base smaller, than in the two succeeding sexual forms presently to be described. The ovarium is bent so that the bucket-like labellum stands uppermost, instead of forming the lower lip as in most Orchids

Fig. 1.



CATASETUM TRIDENTATUM.

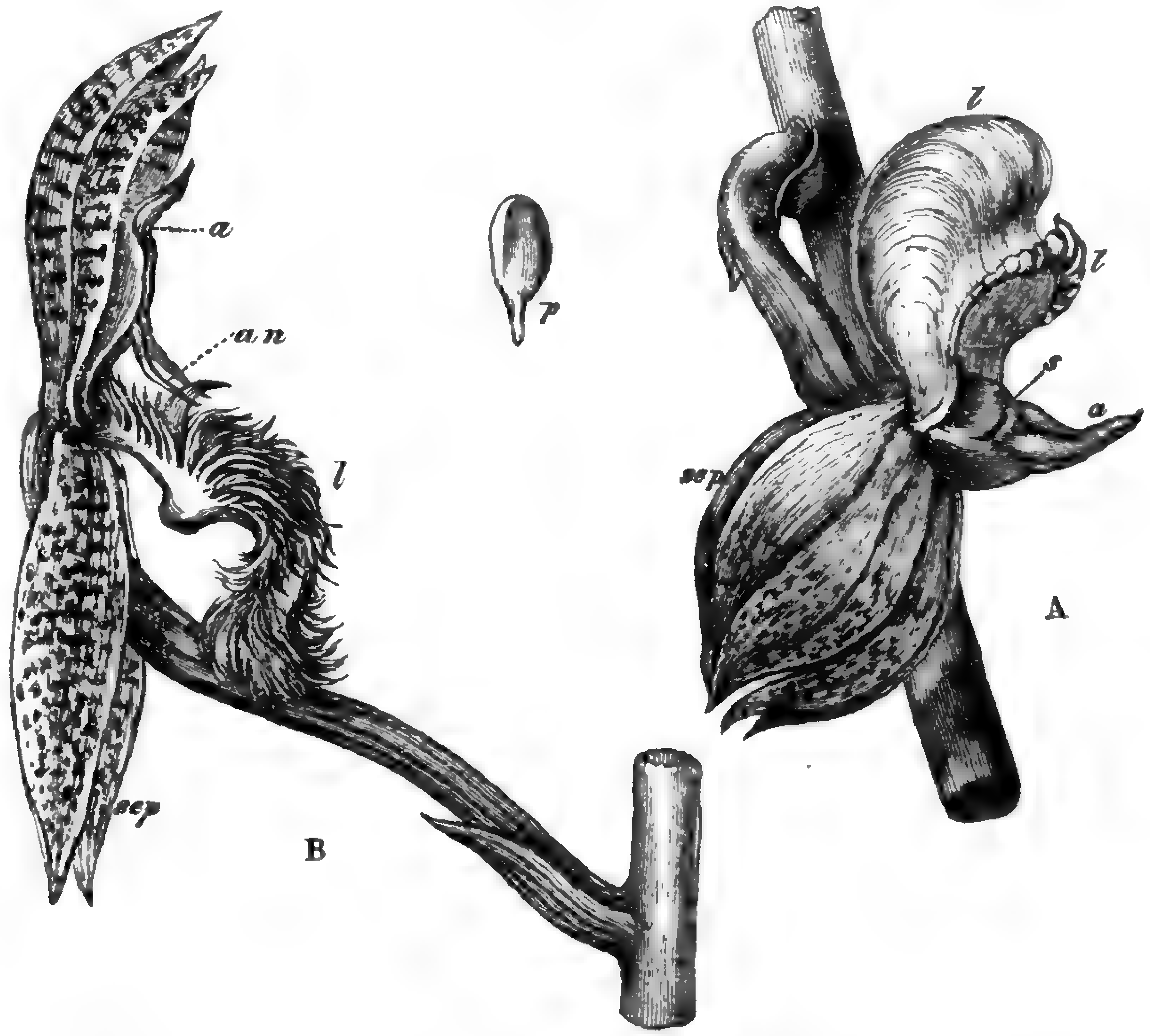
a. anther.
an. antennæ.
pd. pedicel of pollinium.
l. labellum.

A. Side view of flower in its natural position with the properly lower sepals cut off.

B. Front view of column, placed upright.

From what I had myself observed previously to reading Sir R. Schomburgk's paper, I was led to examine carefully the female organs of this species, and, I may add, of *C. callosum* and *C. saccatum.* In no case was the stigmatic surface viscid, as it is in all other Orchids (excepting *Cypripedium*), and as is indispensable for securing the pollen-masses on the rupture of the caudicles. I carefully looked to this point in both young and old flowers of *C. tridentatum.* When the surface of the stigmatic chamber and of the stigmatic canal of the above-named three species is scraped off, after having been kept in spirits of wine, it is found to be composed of utriculi (with nuclei of the proper shape), but not nearly so numerous as with ordinary Orchids. The utriculi cohere more together, and are more transparent. I examined for comparison the utriculi of many kinds of Orchids, which had been kept in spirits, and in all found they were much less transparent. Again, in all three species of *Catasetum* the ovule-bearing cords are short, and the ovules present a considerably different appearance, in being thinner, more transparent, and less pulpy than in the numerous other Orchids examined for comparison. They were, however, in not so completely an atrophied condition as in the genus *Acropera.* Although they correspond so closely in general appearance and position with true ovules, perhaps I have no strict right so to designate them, as I was unable in any case to make out the opening of the testa and the included nucleus; nor were the ovules ever inverted. From these several facts—namely, the shortness, thinness, and smoothness of the ovarium, the shortness of the ovule-bearing cords, the state of the ovules themselves, the stigmatic surface not being viscid, the empty condition of the utriculi —and from Sir R. Schomburgk never having seen *C. tridentatum* producing seed in its native home, we may confidently look at this species of *Catasetum*, as well as the other two species, as male plants.

Fig. 2.



MYANTHUS BARBATUS.
a. anther.
an. antennæ.
l. labellum.

MONACHANTHUS VIRIDIS.
p. pollen-mass, rudimentary.
s. stigmatic cleft.
sep. two lower sepals.

A. Side view of *Monachanthus viridis* in its natural position.
(The shading in both drawings has been added from M. Reiss's drawing in the 'Linnean Transactions.')

B. Side view of *Myanthus barbatus* in its natural position.

With respect to *Monachanthus viridis* and *Myanthus barbatus*, these two forms are seen, in the specimen sent home by Sir R. Schomburgk, and preserved in spirits in the Society's collection, to be borne on the same spike. They are represented in the diagrams, page 153. The flower of the *Monachanthus*, like that of the *Catasetum*, grows lower side uppermost. The labellum is not nearly so deep, especially on the sides, and its edges are crenated. The other petals and sepals are all reflexed, and are not so much spotted as in the *Catasetum*. The bract at the base of the ovarium is much larger. The whole column, especially the filament at its summit and the spike-like anther, is much shorter; and the front of the rostellum is much less protuberant. The antennæ or horn-like prolongations of the rostellum are entirely absent. The pollen-masses are rudimentary: I could find no trace of a viscid disk or of a pedicel; if they exist, they must be quite rudimentary, for there is hardly any space for the imbedment of the disk. The absence of the antennæ in this Orchid, which has no pollen-masses to eject, is an interesting fact, as it accords with the view to which I have been led by an examination of three living species of *Catasetum*, namely, that the function of the antennæ is to convey the stimulus of a touch to the medial part of the rostellum, causing the membrane round the disk to rupture, and consequently the liberation and ejection of the pollen-masses. Instead of a large stigmatic chamber, there is a narrow transverse cleft close beneath the small anther. I was able to insert one of the pollen-masses of the male *Catasetum* into this cleft, which, from having been kept in spirits, was lined with coagulated beads of viscid matter and with utriculi. The utriculi, differently from those in *Catasetum*, were charged (after having been kept in spirits) with brown matter. The ovarium is much longer, thicker near the base, and more plainly furrowed than in *Catasetum*; the ovule-bearing cords are also much longer, and the ovules more opake and pulpy, as in all common Orchids. I believe that I saw the opening at the partially inverted end of the testa with a large nucleus projecting; but as the specimens had been kept many years in spirits, and were somewhat altered, I dare not speak positively. From these several facts it is almost certain that *Monachanthus* is a female plant; and Sir R. Schomburgk saw it seeding abundantly. Altogether this flower differs in a most remarkable manner from that of the male *Catasetum tridentatum*, and it is no wonder that they were formerly ranked as distinct genera.

The pollen-masses offer so curious and good an illustration of a structure in a rudimentary condition, that they are worth description; but first I must briefly describe the perfect pollen-masses of the male *Catasetum*. These consist of a large sheet of cemented or waxy pollen-grains, folded over so as to form a sac with an open slit along the lower surface; into this slit cellular tissue enters whilst the pollen is in the course of development in the bud. Within the lower and produced end of each pollen-mass a layer of highly elastic tissue, forming the caudicle, is attached, the other end being attached to the strap-shaped pedicel of the pollinium. The exterior grains of pollen are more angular, have thicker walls, and are yellower than the interior grains. In the early bud the two pollen-masses are enveloped in two conjoined membranous sacs, which are soon penetrated by the two produced ends of the pollen-masses, and by their caudicles; and then the ends of the caudicles adhere to the pedicel. Before the flower expands, the membranous sacs including the pollen-masses open, and leave them resting naked on the back of the rostellum.

In *Monachanthus* the two membranous sacs containing the rudimentary pollen-masses never open; they easily separate from each other and from the anther. The tissue of which they are formed is thick and pulpy. Like most rudimentary parts, they vary greatly in size and in form. The included, and therefore useless, pollen-masses are not one-tenth of the bulk of the pollen-masses of the male: they are flask-shaped, with the lower and produced end greatly exaggerated, and almost penetrating through the exterior or membranous sac. The flask is closed, and there is no fissure along the lower surface. The exterior pollen-grains are square and have thicker walls than the interior grains, just as in the proper male pollen; and what is very curious, each cell has its nucleus. Now R. Brown* states that, in the early stages of the formation of the pollen-grains in ordinary Orchids, a minute areola or nucleus is often visible; so that the rudimentary pollen-grains of the *Monachanthus* apparently have retained (as is so general with rudiments in the animal kingdom) an embryonic character. Lastly, at the base, within the flask of pollen, there is a little sheet of brown elastic tissue—that is, a vestige of a caudicle—which runs far up the produced end of the flask, but does not (at least in some of the specimens) come to the surface, and could not have been attached to any part of the rostellum. These rudimentary caudicles are, therefore, utterly useless.

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* Transactions of the Linnean Society, vol. xvi. p. 711.

We thus see that every single detail of structure of the male pollen-masses, with some parts exaggerated and some parts slightly modified, is represented by these mere rudiments in the female plant. Such cases are familiar to every observer, but can never be examined without renewed interest.

We now come to the third form, *Myanthus barbatus*, often borne on the same plant with the two preceding forms. Its flower, in external appearance, but not in essential structure, is the most different of all. It generally stands in a reversed position, compared with *Catasetum* and *Monachanthus*—that is, with the labellum downwards. The labellum is fringed, in an extraordinary manner, with long papillæ; it has a quite insignificant medial cavity, at the hinder margin of which a curious curved and flattened horn projects. The other petals and sepals are spotted and elongated, with the two lower sepals alone reflexed. The antennæ are not so long as in the male *C. tridentatum*, and they project symmetrically on each side of the horn-like projection at the base of the labellum, with their tips (which are not roughened with papillæ as in the male flower) almost entering the medial cavity. The stigmatic chamber is of nearly intermediate size between that of the male and female forms; it is lined with utriculi, charged with brown matter. The straight and well-furrowed ovarium is nearly twice as long as in *Monachanthus*, but is not so thick where it joins the flower; the ovules are not so numerous as in the female form, but are opake and pulpy after having been kept in spirits, and resemble them in all respects. I believe, but dare not speak positively as in the case of the *Monachanthus*, that I saw the nucleus projecting from the testa. The pollinia are about a quarter of the size of those of the male *Catasetum*, but have a perfectly well developed disk and pedicel. The pollen-masses were lost in the specimens examined by me; but fortunately M. Reiss has given, in the 'Linnean Transactions,' a drawing of them, showing that they are of due proportional size, and have the proper folded or cleft structure; so that there can hardly be a doubt that they are functionally perfect. As we thus see that both the male and female organs are apparently perfect, *Myanthus barbatus* may be considered as the hermaphrodite form of the same species, of which the *Catasetum* is the male, and the *Monachanthus* the female.

It is not a little singular that the hermaphrodite *Myanthus* should resemble in its whole structure much more closely the male forms of two distinct species (namely *C. saccatum* and, more especially, *C. callosum*) than either its own male or female forms.

Finally, the genus *Catasetum* is interesting in an unusual degree in several respects. The separation of the sexes is unknown in other Orchids, excepting probably in the allied genus *Cycnoches* and in one other member of the *Vandeæ*, namely, *Acropera*. In *Catasetum* we have three sexual forms, generally borne on separate plants, but sometimes mingled together; and these three forms are wonderfully different from each other—much more different than, for instance, a peacock is from a peahen. But the appearance of these three forms on the same plant now ceases to be an anomaly, and can no longer be viewed as an unparalleled instance of variability.

Still more interesting is this genus in its mechanism for fertilization. We see a flower patiently waiting, with its antennæ stretched forth in a well-adapted position, ready to give notice whenever an insect puts its head into the cavity of the labellum. The female *Monachanthus*, not having pollinia to eject, is destitute of antennæ. In the male and hermaphrodite forms, namely *Catasetum* and *Myanthus*, the pollinia lie doubled up like a spring, ready to be instantaneously shot forth when the antennæ are touched. The disk end is always projected foremost, and is coated with viscid matter, which quickly sets hard and firmly affixes the hinged pedicel to the insect's body. The insect flies from flower to flower, till at last it visits a female or hermaphrodite plant; it then inserts one of the balls of pollen into the stigmatic cavity. When the insect flies away, the elastic caudicle, made weak enough to yield to the viscidity of the stigmatic surface, breaks, and leaves behind the pollen-mass; then the pollen-tubes slowly protrude, penetrate the stigmatic canal, and the act of fertilization is completed. Who would have been bold enough to surmise that the propagation of a species should have depended on so complex, so apparently artificial, and yet so admirable an arrangement?

Notice of a Collection of Algæ made on the North-West Coast of North America, chiefly at Vancouver's Island, by DAVID LYALL, Esq., M.D., R.N., in the years 1859-61. By W. H. HARVEY, M.D., F.R.S. & L.S., Professor of Botany in the University of Dublin, &c.

[Read February 20, 1862.]

SEVERAL parcels of Algæ, collected by Dr. David Lyall on the coasts of Vancouver's Island and in the neighbouring seas, and communicated by him to the herbarium at Kew, have been placed in my hands for determination. In the subjoined descriptive catalogue I have given the results of my examination, and shall merely preface the technical matter by a few general observations.

The whole number of species ascertained is 107, of which 100 are marine, and 7 freshwater species. The latter are as follows :—

A Vaucheria (*undeterminable*).
Batrachospermum moniliforme.
Cladophora glomerata.
Conferva rivularis.
Conferva floccosa.
A Zygnema (*undetermined*).
Hydrurus penicillatus.

All of these (including probably the undeterminable ones) are also British, and only one of them, *Hydrurus penicillatus*, is of local distribution. Dr. Lyall's specimens of this plant are of small size; but at Santa Fé, in New Mexico, Mr. Fendler has collected it in great abundance and of gigantic size, his specimens being sometimes two feet in length.

Of the 100 marine Algæ, *eleven* are either new species or well-marked new forms to which I have given specific names, namely these :—

Agarum fimbriatum, *H.*
Laminaria apoda, *H.*
Ectocarpus oviger, *H.*
Rhodomela Lyallii, *H.*
Polysiphonia senticulosa, *H.*
Hymenena latissima, *H.*
Cystoclonium gracilarioïdes, *H.*
Callophyllis flabellulata, *H.*
Prionitis Lyallii, *H.*
Schizymenia coccinea, *H.*
Callithamnion subulatum, *H.*

Of these the most remarkable is *Laminaria apoda*, which differs, as its name imports, from all other species of *Laminaria* in absolutely wanting a stipes. In other species, indeed, the stipes varies from less than half an inch to 12–15 feet in length; but in all cases a more or less obvious stipes interposes between the root and the lamina, and the new portion of frond grows between the apex of the stipes and the base of the lamina. In our *L. apoda* the stipes is represented by a basal callosity or thickening of the lamina, from which a fascicle of fibrous branching roots directly springs. Dr. Lyall has sent numerous specimens of various ages and sizes, and all have precisely similar characters; I do not doubt, therefore, that this is a well-marked and limited form. The nearest approach to *L. apoda* that I have seen occurs in some of the shorter-stemmed varieties of *L. dermatodea*; but I am not possessed of any specimen which could be regarded as intermediate.

I am not so confident of the distinctness of my *Agarum fimbriatum* from *A. pertusum*. The fimbriated character is not a very certain one; for it occurs occasionally in Algæ when developed under unusual circumstances; or it may arise from proliferous growth, after wounding at an early age. More specimens, and specimens of various ages, are required fully to establish this species.

Of *Hymenena latissima* many specimens were collected, but comparatively few of them were of adult age. The younger are undistinguishable from some *Nitophylla* in structure, the generic distinction not generally becoming obvious till fruit begins to be formed. Then the long lines of tetraspores are obviously separated by immersed and anastomosing veins, as in the original *H. fissa*, from which species and from *H. fimbriata* our plant is quite distinct.

Of the other new species, *Callophyllis flabellulata* is remarkable for closely simulating *Euthora cristata*; *Prionitis Lyallii* for its extraordinary variations in ramification and size; and *Callithamnion subulatum* for combining the characters of *C. americanum* and *C. floccosum.*

The species peculiar to the North-west Coast of America are 32, of which 7 are Melanosperms and 25 Rhodosperms, viz.—

Cystophyllum Lepidium, *P. & R.*
Phyllospora Menziesii, *Ag.*
Nereocystis Lütkeanus, *P. & R.*
Alaria marginata, *P. & R.*
Agarum fimbriatum, *H.*
Laminaria apoda, *H.*
Ectocarpus oviger, *H.*

Rhodomela Larix, *Ag.*
R. floccosa, *Ag.*
R. Lyallii, *H.*
Polysiphonia Californica, *H.*
P. senticulosa, *H.*
Amphiroa Californica, *Dcne.*
Hymenena fimbriata, *P. & R.*
H. latissima, *H.*
Rhabdonia Coulteri, *H.*
Rhodymenia pertusa, *Ag.*
Cystoclonium gracilarioïdes, *H.*
Callophyllis flabellulata, *H.*
Constantinea Sitchensis, *P. & R.*
Gigartina mollis, *Bail. & Harv.*
Chondrus affinis, *H.*
Endocladia muricata, *Ag.*
Halosaccion Hydrophora, *J. Ag.*
Prionites Lyallii, *H.*
P. lanceolata, *H.*
Schizymenia Mertensiana, *P. & R.*
S. coccinea, *H.*
Microcladia Coulteri, *H.*
M. borealis, *P. & R.*
Ptilota Californica, *P. & R.*
Callithamnion subulatum, *H.*

The following, from among the peculiar North-west American species are "represented" by allied species in other seas, viz.—

Phyllospora Menziesii, by Phyllospora comosa, in Australia.
Alaria marginata, by Alaria esculenta, in Europe.
Rhodomela Larix, by Rhodomela lycopodioïdes, in Europe.
Hymenena fimbriata, by Hymenena fissa, at the Cape of Good Hope.
Rhodymenia pertusa, by Rhodymenia polymorpha, in Australia.

Callophyllis flabellulata, by Callophyllis coccinea, *var*. pusilla, in Australia.
Constantinea Sitchensis, by Constantinea Rosa marina, Kamtskatka.
Chondrus affinis, by Chondrus crispus, in Europe.
Halosaccion Hydrophora, (an *analogous* species to) Gloiosaccion Brownii, in Australia.
Prionitis Lyallii, by Prionitis crinita, in Kamtskatka.
Callithamnion subulatum, by Callithamnion floccosum, in Europe.

The following 43 species are common to the Atlantic Coasts of North America, and those marked with an asterisk are peculiarly American:—

*Fucus furcatus, *Ag.*
F. vesiculosus, *L.*
Desmarestia viridis, *Lx.*
D. aculeata, *Lx.*
*Alaria Pylaii, *Grev.*
Laminaria saccharina, *Ag.*
*L. dermatodea, *De la Pyl.*
L. fascia, *Ag.*
Striaria attenuata, *Grev.*
Chorda lomentaria, *Lgb.*
Ectocarpus siliculosus, *Lgb.*
E. littoralis, *Lgb.*
Odonthalia angustifolia, *Suhr.*
*Chondria atropurpurea, *H.*
Polysiphonia atrorubescens, *Grev.*
P. urceolata, *Grev.*
Corallina officinalis, *L.*
Delesseria Hypoglossum, *Ag.*
D. alata, *Ag.*
Gracilaria confervoïdes, *Grev.*
Plocamium coccineum, *Lyngb.*
Rhodymenia palmata, *Grev.*
Rhodymenia Palmetta, *Grev.*
Ahnfeldtia plicata, *Ag.*
Callophyllis laciniata, *Kg.*
Gigartina mamillosa, *Lx.*
Halymenia ligulata, *Ag.*
Gloiosiphonia capillaris, *Carm.*
Ceramium rubrum, *Ag.*
C. diaphanum, *Ag.*
C. tenuissimum, *Ag.*
Callithamnion polyspermum, *Ag.*
*C. Americanum, *H.*
C. floccosum, *Ag.*
Porphyra vulgaris, *Ag.*
Enteromorpha compressa, *Lk.*
E. intestinalis, *Lk.*
Ulva latissima, *Ag.*
U. Linza, *L.*
Cladophora arcta, *H.*
C. glaucescens, *Griff.*
C. lætevirens, *Kg.*
Hormosira Carmichaëlii, *Kg.*

The following 45 are natives of the British Islands, and generally of the Atlantic Coasts of Europe; those marked with an asterisk have not yet been found on the Atlantic Coast of America:—

Fucus vesiculosus, *L.*
Desmarestia viridis, *Lx.*
D. aculeata, *Lx.*
*D. ligulata, *Lx.*
*Carpomitra Cabreræ, *Kg.*
Laminaria saccharina, *Ag.*
L. fascia, *Ag.*
Striaria attenuata, *Grev.*
Chorda lomentaria, *Lx.*
Ectocarpus littoralis, *Lgb.*
E. siliculosus, *Lgb.*
Polysiphonia atrorubescens, *Grev.*
P. urceolata, *Grev.*
*Laurencia pinnatifida, *Lx.*
Corallina officinalis, *L.*
Delesseria Hypoglossum, *Ag.*
D. alata, *Ag.*
Gracilaria confervoïdes, *Grev.*

Plocamium coccineum, *Lyngb.*
Rhodymenia palmata, *Grev.*
R. Palmetta, *Grev.*
Ahnfeldtia plicata, *Ag.*
Callophyllis laciniata, *Kg.*
*Kallymenia reniformis, *Ag.*
Gigartina mamillosa, *Ag.*
Halymenia ligulata, *Ag.*
*Schizymenia Dubyi, *Ag.*
Gloiosiphonia capillaris, *Carm.*
Ceramium rubrum, *Ag.*
C. diaphanum, *Ag.*
C. tenuissimum, *Ag.*
*Callithamnion Arbuscula, *Lgb.*
Callithamnion polyspermum, *Ag.*
*C. thujoideum, *Ag.*
C. floccosum, *Ag.*
*Codium tomentosum, *Ag.*
Porphyra vulgaris, *Ag.*
Enteromorpha compressa, *Lk.*
E. intestinalis, *Lk.*
Ulva latissima, *Ag.*
U. Linza, *L.*
Cladophora arcta, *H.*
C. glaucescens, *Griff.*
C. lætevirens, *Kg.*
Hormosira Carmichaëlii, *Kg.*

The two following are natives of the Mediterranean Sea, but not of the British Isles nor of the Atlantic Coasts of Europe:—

Amphiroa palmata, *Kg.*
Ulva fasciata, *Del.*

The following 20 are found on the West Coast of South America; those marked with an asterisk are also British:—

*Desmarestia viridis, *Lx.*
Macrocystis pyrifera, *Ag.*
*Laminaria saccharina, *Ag.*
*Chorda lomentaria, *Grev.*
*Ectocarpus siliculosus, *Lyngb.*
Polysiphonia dendroïdea, *Mont.*
*Corallina officinalis, *L.*
*Gracilaria confervoïdes, *Grev.*
*Plocamium coccineum, *Lyngb.*
Rhodymenia corallina, *Bory.*
*Ahnfeldtia plicata, *Ag.*
Callophyllis variegata, *Kg.*
Gigartina radula, *Ag.*
Iridæa cordata, *Bory.*
*Ceramium rubrum, *Ag.*
*C. diaphanum, *Ag.*
*Codium tomentosum, *Ag.*
*Porphyra vulgaris, *Ag.*
*Enteromorpha compressa, *Ag.*
*Ulva latissima, *Ag.*

The following 20 are common to Australia; those marked with an asterisk are also British:—

*Desmarestia ligulata, *Lgb.*
*Carpomitra Cabreræ, *Kg.*
Macrocystis pyrifera, *Ag.*
*Chorda lomentaria, *Grev.*
*Ectocarpus siliculosus, *Lgb.*
*Amphiroa corymbosa, *Lx.*
*Corallina officinalis, *L.*
*Gracilaria confervoïdes, *Grev.*
*Plocamium coccineum, *Lgb.*
Gigartina radula, *Ag.*
*Halymenia ligulata, *Ag.*
Ceramium cancellatum, *Ag.*
*C. rubrum, *Ag.*
*C. diaphanum, *Ag.*
*C. tenuissimum, *Ag.*
*Codium tomentosum, *Ag.*
*Porphyra vulgaris, *Ag.*
*Enteromorpha compressa, *Ag.*
*Ulva latissima, *Ag.*
Ulva rigida, *Ag.*

From the foregoing lists it appears, taking Dr. Lyall's collections for a fair specimen of the marine botany of Vancouver's Island, that, 1st. There are no local species of *Chlorospermeæ.* The few species that were found by Dr. Lyall are all plants of very wide distribution.

2nd. The species of *Melanospermeæ* and *Rhodospermeæ* that are peculiar to the North-west Coast of America amount to about one-third of the whole number collected.

3rd. About one-third of these peculiar species have representatives in other countries; namely, four in Australia, four in Europe, two in North-eastern Asia, and one at the Cape of Good Hope.

4th. Forty-three per cent. of the whole number collected are common to the East Coast of North America, 45 per cent. to the Atlantic Coasts of Europe, 20 per cent. to the West Coast of South America, and 20 per cent. to the Australian shores. This comparison shows that there is greater affinity between the marine vegetation of the Western Coasts of America and of Europe than between the Western and Eastern Coasts of America.

5th. Out of those common to West and East America, all except six are also British; while of those common to West America and to Britain, eight have not yet been recorded from the East Coast of America.

6th. Of those common to South America, three-sevenths are also British; and of those common to Australia, four-fifths are British. But of those species which are common to Britain and either to South America or to Australia, all but one (*Carpomitra Cabreræ*) are so widely diffused that they may be regarded as almost cosmopolitan.

On the whole, the collection does not give evidence of a very extensive marine flora, but rather of a vegetation abounding in species of larger and coarser growth, and deficient in those delicately organized species which frequent shallow bays and estuaries. The most remarkable and characteristic of the Vancouver-Island Algæ are the *Laminariaceæ*, many of which are of such gigantic size that full-grown specimens can hardly be expected ever to be seen in Europe. The *Nereocystis* has a stipes said to attain the length of 300 feet. The *Alariæ* probably have fronds of 20 to 30 feet in length—an enormous size for an undivided lamina of cellular tissue; and the *Costaria* and *Agarum*, though much smaller, still reach dimensions which appear extraordinary when compared with the dwarfer Laminarioid plants of the British shores. The selecting of herbarium specimens, characteristic without being inconveniently large, of such unwieldy objects is no easy task; and Dr. Lyall deserves thanks and praise for the manner in which he has performed it, nor less for the great care with which he has preserved all his specimens, the minute localization of each, and the pains bestowed in furnishing extensive suites of each species. So variable are some of these Algæ in form, that, without examining long suites of specimens of different sizes and ages, it would be difficult or impossible to say what was a species and what a variety. Even with the ample materials supplied to me by Dr. Lyall, I fear that I have not in every case succeeded in unravelling this tangle.

MELANOSPERMEÆ.

1. Fucus vesiculosus, *var.* evesiculosus, *J. Ag. Sp. Alg.* i. 210.
Common between tide-marks. Vancouver's Island; Esquimalt and Victoria Harbours.

A narrower form on the outer sea-coast; a broader within the harbour. Also a very dwarf form from the outer sea-coast, 1–2 inches high, once-forked and fruiting; very similar to the dwarf variety from the Canary Islands, described by Montagne, 'Crypt. Canar.'

2. Fucus furcatus, *Ag.?* *Ic.* t. 14; *J. Ag. Sp. Alg.* i. p. 209.
Between tide-marks. Esquimalt; Vancouver's Island.

Of Agardh's plant I have seen no authentic specimen. Dr. Lyall's specimens differ from *F. vesiculosus*, var. *evesiculosus*, chiefly in the more immersed, less defined midrib, the uniformly narrower frond, 2–3 lines, rarely 4 lines wide, and the more slender, compressed, not turgid receptacles. My *F. Wrightii*, from Japan, scarcely differs. I fear that neither ought to be regarded as other than local varieties of *F. vesiculosus*, which sometimes, even in Europe, occurs with as narrow fronds. The elder Agardh's figure, above quoted, is worthless as a guide to the species described by J. Agardh.

3. CYSTOPHYLLUM LEPIDIUM (*Rupr.*). Caule crasso brevi, frondibus elongatis teretibus (crassiusculis) inermibus pinnato-ramosissimis, ramis undique egredientibus geminatis sparsisque basi sæpe foliosis, foliis lineari-lanceolatis enerviis planis acutis, ramulis vesiculiferis subcorymbosis, vesiculis sub apice ramuli indivisi solitariis ovalibus mucronatis, receptaculis .... ?—*Cystoseira Lepidium, Rupr. Alg. Mar. Ochotzk*, p. 155.
On rocks below low-water mark. Entrance of Esquimalt Harbour; also dredged in 14 fathoms at St. Juan Island, 48° 30′ N., 132′ W.

Stem 2–3 inches long. Fronds numerous, closely inserted, 2–3 feet long, 1–1½ line in diameter, in outline of branches lanceolate. Lateral branches 4–6 inches long, in pairs or irregularly scattered, patent, sub-bipinnate; the lower pinnules leaf-bearing, the upper vesiculiferous, each ramulus having a vesicle below its apex. Vesicles 1–1½ line long, like the pods of some *Lepidium*. No fruit on our specimens, which quite agree with those distributed by Dr. Ruprecht, from the Sea of Ochotzk. Though nearly allied to *C. geminatum*, J. Ag., it appears to be distinct.

4. Phyllospora Menziesii, *Ag.*; *Harv.*; *Ner. Bor. Amer.* i. p. 62, t. 3. f. B.

Rocks at low tide, outer sea-coast; Esquimalt and Fuca Strait. *Dr. Lyall & C. Wood.*

5. Desmarestia viridis, *Lamour.*; *Ner. Bor. Amer.* i. p. 77.

Rocks below low-water mark; Esquimalt Harbour and Fuca Strait, *Dr. Lyall*; cast ashore, Esquimalt, *C. Wood*; dredged in 6–8–10 fathoms *Dr. Lyall & C. Wood.*

6. Desmarestia aculeata, *Lamour.*; *Ner. Bor. Amer.* i. p. 78.

Rocks at low water; Esquimalt Harbour, and dredged in 8–10 fathoms, *Dr. Lyall & C. Wood.*

7. Desmarestia ligulata, *Lamour.*; *Ner. Bor. Amer.* i. p. 78.

Rocks below low-water mark; Esquimalt Harbour, *Dr. Lyall & C. Wood*; Burrard's Inlet, Br. Columbia, *C. Wood*; dredged in 10 fathoms in sea water, sp. gr. 1·016, a low sp. gr. caused by admixture of water from the melted snows of the surrounding mountains. Sp. gr. in Straits of Georgia, 1·026, *C. Wood.*

Some of the specimens are of ordinary breadth; others are of the widest variety constituting the *D. herbacea* of authors (*Fucus herbaceus, Turn.* t. 99).

8. Carpomitra Cabreræ, *Kütz*; *Harv. Phyc. Brit.* t. 14.

Fuca Strait, *Dr. Lyall.*

A new and unexpected habitat for this local plant. Dr. Lyall's solitary specimen is in fruit, and does not materially differ from British specimens.

9. Macrocystis pyrifera, *Ag.*; *Harv.*; *Ner. Bor. Amer.* i. p. 84.

Fuca Strait and outer sea-coast; Esquimalt, *Dr. Lyall.*

10. Nereocystis Lütkeana, *Post. & Rupr. Illustr.* t. 8, 9; *Ner. Bor. Amer.* i. p. 85.

Rocks at low water; Esquimalt and Fuca Strait, *Dr. Lyall*; dredged in Burrard's Inlet, in 10 fathoms, *C. Wood.*

Besides a large specimen sent in a cask to the Kew Museum, Dr. Lyall has communicated numerous well-dried herbarium specimens of the young plant, which well illustrate the progressive development of the frond. The youngest specimen sent has a stem two inches long, tipped by a bulbous vesicle 2–3 lines in diameter, carrying at its summit two falcate-lanceolate leaves, which show a tendency to split from the base upwards, the line of future separation being indicated nearly to the middle of each leaf. In the next stage the stem has grown but little; but the apical bulb has attained the diameter of 4–5 lines, and the two leaves have, by medial splitting, become four, of which two are perfectly free, and two still connate for a short space near the base—thus showing (as is also more clearly seen in older plants) that the fissure takes place both from the base upwards and from the apex downwards. Other specimens, in which the stem is 6–8 inches long, the bulb 1–1½ inch in diameter, and the leaves 14-16 inches long, are not more advanced in subdivision than the first here described. The age and size at which splitting begins probably depend on the depth at which a specimen grows, those in shallow water beginning to divide at an earlier age. All after-growth consists in the lengthening of the stem till it reaches from 200 to 300 feet, in the increasing size and hollowing out of the apical vesicle till it becomes six feet or more in length, and in the multiplication of leaves, by continual bisection, until there results a huge, geminate tuft of foliage, always separated at base into two distinct bundles by the true apex of the vesicle, from which no leaves spring. Eventually each leaf is 20–30 feet long. In Dr. Lyall's larger herbarium specimens there are eight leaves, each partially bisected.

11. **Alaria Pylaii**, *Grev.*; *Harv.*; *Ner. Bor. Amer.* i. p. 89.
On stones at the mouth of the Esquimalt Harbour and St. Juan de Fuca, *Dr. Lyall & C. Wood.*

Most of the specimens are immature. The few that produce pinnæ have them broadly obovate, broader in proportion to their length than on specimens from Newfoundland. In other respects the plants agree.

12. **Alaria marginata**, *Post. & Rupr.*? *Harv.*; *Ner. Bor. Amer.* i. p. 89.
Esquimalt Harbour, &c.

The specimens are immature, without pinnæ, though some are of large size, 5–6 feet long. Even in the youngest state, this differs from the preceding by the very broad midrib, 1–1½ inch wide in fronds where the stipes is 3–4 lines wide; and half-an-inch wide in younger fronds, with stipes two lines wide.

13. Costaria Turneri, ***Grev.*** **(C. Turneri** ***and*** **C. Mertensii,** ***J. Ag. Sp. Algæ,*** **i. p. 139, 140;** ***Harv.; Ner. Bor. Amer.*** **i. p. 90.)**
Rocks at low water; Fuca Strait and Esquimalt, ***Dr. Lyall.***

The numerous and beautifully preserved specimens sent vary with fronds cordate-ovate, ovate, ovato-lanceolate, and lanceolate, these forms passing insensibly one into another. The largest sent by Dr. Lyall are upwards of a foot wide and 2½ feet long, and are frequently perforated toward the base. When full-grown, the fronds measure 10–12 feet in length.

14. AGARUM FIMBRIATUM, n. sp. Stipite compresso-plano demum fimbriato-pinnato, costa latiore continuato, lamina membranacea bullata hic illic foraminibus irregularibus raris pertusa, basi subcordata, margine crispato eroso-fimbriato.
Dredged in 4–10 fathoms; Esquimalt Harbour, ***Dr. Lyall & C. Wood.***

Stipes 1–2 inches long, flattened, 3–4 lines wide, at first simple, afterwards pinnated with horizontally patent, root-like, subulate processes, continued through the frond as an immersed costa, 4–6 lines wide. Fronds 2–3 feet long, 1–1½ wide, cordate at base; the margin strongly curled, and in all the older specimens jagged and fimbriated with irregular excurrent processes. The younger fronds are very much blistered (bullated), but have few foramina. The older are irregularly perforated with holes of unequal size and different shape, more abundant toward the margin. This must be near *A. pertusum*, P. & R., but differs in the fimbriated margin and stipes, if these be constant characters. More specimens are needed to ascertain this point.

15. Laminaria saccharina, ***Ag.; Harv.; Ner. Bor. Amer.*** **i. p. 92.**
Esquimalt Harbour, &c., common, ***Dr. Lyall.***

Of this common plant many varieties are sent; some with very broad, others with narrow fronds, both varying greatly in proportionate length to breadth. Some have ***strictly ovate*** fronds, not more than once and a half as long as broad; others ***ovato-lanceolate,*** four times as long as broad; and others ***lanceolate*** and ***linear-lanceolate,*** many times as long as broad. One has a nearly ***orbicular*** frond! The substance varies from membranous to coriaceous, and the colour from olive-green to dark brown.

16. Laminaria dermatodea, ***De la Pyl.; Ner. Bor. Amer.*** **p. 92.**
Fuca Strait and Esquimalt, ***Dr. Lyall & C. Wood.***

A series of specimens, young and mature. The younger and uncloven specimens differ from *L. saccharina* in their flattened, widened-upward stipe and less wavy frond; the mature ones from *L. digitata* in the stipe, &c.

17. **Laminaria apoda**, n. s. Stipite nullo!, lamina basi calloso-radicante late cordata coriacea demum apice in lacinias numerosas plus minus fissa v. omnino multipartita, radice ramosissima.

Rocks between tide-marks, Fuca Strait, *Dr. Lyall.*

Frond originating in a callus (or bulbiform stipe) attached to the rocks by many branching fibres, as in other species. Lamina sessile, a foot wide or more, 1-2 feet long (or more?), cordate at base, ovate or ovato-lanceolate in outline, coriaceous, at first probably undivided, but in all our specimens more or less split, as in *L. digitata*. Some are cleft quite to the base into many narrow segments. A very remarkable species, characterized by the absence of stipe, unless the hardened and thickened base of the lamina be so called. Some specimens of *L. dermatodea* have very short stipites, not more than half an inch long; and such serve to link our present plant with the stipitate species.

18. Laminaria fascia, *Ag.*; *Harv. Ner. Bor. Amer.* i. p. 91.

Esquimalt and Fuca Strait, *Dr. Lyall & C. Wood.*

19. Striaria attenuata, *Grev.*; *Harv. Ner. Bor. Amer.* (*Suppl.*) iii. p. 123.

Orcas Island, Vancouver, *Dr. Lyall.*

20. Chorda lomentaria, *Grev.*; *Harv. Ner. Bor. Amer.* i. p. 98.

In rock-pools, Esquimalt and Fuca Strait, *Dr. Lyall.*

21. **Ectocarpus oviger**, n. sp. Filis (3–5-uncialibus) decomposito-ramosissimis viridibus, ramis ramulisque alternis v. secundis erectis, ultimis longiusculis vagis, sporis ovoideis ad ramos subsessilibus sæpe secundis.

Hab. Stems of *Nereocystis*; Esquimalt, *Dr. Lyall.*

This has the aspect of *E. littoralis*, Ph. Br. (*E. firmus*, J. Ag.), but differs in the fruit, which is abundant in our specimens, and very like that of *E. granulosus*, from which our *E. oviger* differs in ramification.

22. Ectocarpus littoralis, *Ner. Bor. Amer.* i. p. 139.

On rocks and Fuci, Fuca Strait and Esquimalt, *Dr. Lyall & C. Wood.*

23. Ectocarpus siliculosus, *Lyngb.*; *Ner. Bor. Amer.* i. p. 139.

On stems of *Nereocystis*, Esquimalt, *Dr. Lyall.*

24. Ectocarpi sp.

Nanaimo, on rocks, *Dr. Lyall.*

Not in fruit, and overgrown with parasites; may be a var. of *E. littoralis.*

RHODOSPERMEÆ.

25. Rhodomela larix, *Ag.*; *Harv. Ner. Bor. Amer.* ii. p. 24.

On rocks and drifted, Fuca Strait; Point Roberts; Esquimalt; St. Juan de Fuca, *Dr. Lyall & C. Wood.*

26. Rhodomela floccosa, *Ag.*; *Harv. Ner. Bor. Amer.* ii. p. 24.

Fuca Strait and Point Roberts, *Dr. Lyall & C. Wood.*

27. **Rhodomela Lyallii**, n. sp. Fronde valde compressa elata decomposita pinnata disticha, pinnis pinnulisque in ambitu lanceolatis, ramulis subulatis alternis brevibus, ceramidiis ovatis subsessilibus stichidiisque racemulosis.

Adrift on the beach, Fuca Strait, *Dr. Lyall.*

12–20 inches high, regularly pinnate 3–4 times, all the divisions lanceolate (not corymbulose or fastigiate) in outline; the ramuli of the minor pinnules subequal, the lowest not conspicuously longer than the rest. In fruit, every ramulus of each ultimate plumule is generally converted into either a conceptacle or a stichidium, without any shortening of the rachis; hence the arrangement is racemulose, rather than corymboso-fasciculate, by which character, together with the larger size, more compressed frond, and more regular ramification, this plant differs from *R. floccosa.*

28. Odonthalia angustifolia, *Suhr.*?

On the beach, Esquimalt, *Dr. Lyall.*

29. Chondria atro-purpurea, *Harv. Ner. Bor. Amer.* ii. p. 22, t. 18. E.

Fuca Strait, *Dr. Lyall.*

30. Polysiphonia dendroidea, *Mont. Syllog.* p. 421, No. 1491; *Fl. Boliv.* p. 16, t. 5. f. 1.

Dredged in 10 fathoms, and cast ashore, Esquimalt, *Dr. Lyall.*

Nearly allied to *P. parasitica* and *P. pennata*, but more robust.

31. Polysiphonia atrorubescens, *Grev.*; *Harv. Ner. Bor. Amer.* ii. p. 40; *Ph. Br.* t. 172.

Esquimalt, and Fuca Strait, dredged in 10 fathoms, and cast ashore, *Dr. Lyall.*

Var. β. *minor.* Filis tenuioribus brevioribusque; Orcas Island, *Dr. Lyall.*

32. Polysiphonia Californica, *Harv. Ner. Bor. Amer.* ii. p. 48.

Esquimalt, &c., common, *Dr. Lyall.*

A very abundant species. The herbarium contains upwards of 100 specimens of all sizes, from 1 to 10–12 inches high. The more pinnated specimens pass, by slight changes, into the following. Perhaps all might be united with *P. gemmifera*, P. & R.

33. **Polysiphonia Californica**, var. β. **plumigera.** Filis rigidiusculis distanter ramosis, ramis primariis alternis infra longe nudis supra crebre alterne plumuligeris; plumulis bi- tri-pinnatis subfasti-

giatis, pinnulis ultimis flexuoso-alternis subulatis erecto-patentibus; articulis 14–16-siphoniis, ramorum diametro 8–12-plo v. multoties longioribus, ramulorum diametro æqualibus v. vix brevioribus.

Sandy beach near low water, Point Roberts, lat. 49° N., *Dr. Lyall.*

Filaments 5–6 inches long, flaccid, but not softening, sparingly divided into a few, long, naked primary branches, which sometimes have one or two small subulate ramuli below, and are closely set near the apex with bi-pinnate branchlets or plumules. Each plumule is 3-4 lines long and 2–3 broad, with a circumscribed outline. Colour, brown-red. A distinctly marked form, but not specifically different from the common *P. Californica.*

34. Polysiphonia urceolata, *Grev.*; *Harv. Ner. Bor. Amer.* ii. p. 32; *Ph. Br.* t. 167.

Esquimalt; Fuca Strait; Point Roberts: common.

35. POLYSIPHONIA SENTICULOSA, n. sp. Filis 2–3-uncialibus pellucide articulatis capillaribus mollibus cæspitosis siccitate badiis decomposite ramosissimis, ramis alternis secundisve bis terve divisis, secundariis strictis virgatis ramuliferis, ramulis brevibus subuliformibus alternis erecto-patentibus, articulis 4-siphoniis ramorum diametro 4–6-plo longioribus, ramulorum diametro æqualibus v. brevioribus.

Orcas Island, *Dr. Lyall.*

36. Laurencia pinnatifida, *Lamour.*; *Harv. Ner. Bor. Amer.* ii. p. 70; *Ph. Br.* t. 55.

Low-water rocks, St. Juan de Fuca Strait, *C. B. Wood*; Victoria Harbour, *Dr. Lyall.*

37. Amphiroa Californica, *Deane*; *Harv. Ner. Bor. Amer.* ii. p. 86.

Imbedded in roots of *Laminariæ*, Fuca Strait, *Dr. Lyall.*

38. Amphiroæ sp. indeterminata.

St. Juan de Fuca, S.W., *C. Wood*; Esquimalt, *Dr. Lyall.*

39. Amphiroa corymbosa, *Harv. Ner. Austr.* p. 99. t. 38.

Fragments only.

40. AMPHIROA (ARTHROCARDIA) EPIPHLEGNOIDES, *J. Ag. MSS., fide Lenorm.* Fronde dichotoma v. vage ramosa flabelliformi, articulis difformibus, aliis oblongis vix compressis v. teretibus, aliis cuneatis v. polyhedris margine obtusis, ceramidiis paucis articulis latioribus insidentibus.—*A. rudis,* Harv. in Herb. D.C.D.

Rocks near low-water mark, Fuca Strait, *Dr. Lyall.*

3-4 inches long. Lower and some of the upper joints like those of *Corallina officinalis*; the medial generally broad, short, and compressed, triangular or oblate, always rounded at the edge. A native also of Tahiti.

41. CORALLINA OFFICINALIS, *L.*; *Harv. Ner. Bor. Amer.* ii. p. 83.

Rocks between tide-marks, Esquimalt, *Dr. Lyall.*

42. Delesseria hypoglossum, *var.* arborescens, *Lamour.*; *D. arborescens, De la Pyl.*
Fuca Strait, *Dr. Lyall.*

Fine specimens, not unlike some from the North of Ireland, or the "*D. arborescens*" of the French coast.

43. Delesseria alata, *Lamour.*, var. latissima.
On stems of *Nereocystis, Dr. Lyall.*

The fronds, though evidently not fully developed, are of extraordinary width; the broadest ½–¾ inch, the narrower ¼ inch wide.

44. Hymenena fimbriata, *P. & R.*; *Harv. Ner. Bor. Amer.* ii. p. 102.
On the beach, Victoria Harbour; Esquimalt, *Dr. Lyall & C. Wood.*

45. **HYMENENA LATISSIMA**, n. s. Fronde latissima, juniore flabelliformi, adulta vage partita v. laciniata infra venulosa sursum subavenia, laciniis latissime cuneatis v. flabellatis inciso-lobatis, lobulis rotundatis, cystocarpiis sparsis, soris totam frondem demum percurrentibus.
Esquimalt Harbour, dredged and adrift, *Dr. Lyall, C. Wood.*

Fronds 12–15 inches long and wide, variously cleft, the segments fan-shaped, cut at the apex into many, short, round-topped lobes. The lower half of the frond is traversed with many conspicuous, subparallel, anastomosing veins; the upper apparently nerveless, until the tetrasporic fruit is formed, when the interspaces of the sori indicate the lines of nervation; and in older specimens anastomosing nerves may be clearly traced, even to the extremities. Colour, a bright red. The herbarium contains specimens with both kinds of fruit; but the bulk of those sent are without fructification, and consequently not clearly distinguishable from a *Nitophyllum.*

46. Nitophylli? *v.* Hymenenæ species?
Victoria Harbour, in deep water, *Dr. Lyall.*

Specimens without fruit, much torn, and proliferous from the wounds, and therefore not determinable. Some look as if they belonged to *Nitophyllum laceratum*, and others like a divaricated state of *Hymenena.*

47. Gracilaria confervoides, *Grev.*; *Harv. Ner. Bor. Amer.* ii. p. 108.
Esquimalt, *Dr. Lyall.*

A deep-water variety, very much resembling, in ramification and aspects, our *Cystoclonium gracilarioides*, but quite distinct in structure.

48. Rhabdonia Coulteri, *Harv. Ner. Bor. Amer.* ii. p. 154, t. 23. B.
Esquimalt, *C. B. Wood.*

A single specimen, in fruit (*cystocarpia*).

49. Plocamium coccineum, *Lyngb.*; *Harv. Ner. Bor. Amer.* ii. p. 153.
Dredged in 6–8 fathoms, Esquimalt, *Dr. Lyall*; low-water rocks, Fuca Strait, *C. Wood.*

Apparently common; several specimens sent.

50. Rhodymenia pertusa, *J. Ag.*; *Harv. Ner. Bor. Amer.* ii. p. 147.
Cast ashore, Point Roberts; and on rocks at low water, Fuca Strait, *Dr. Lyall.*

Fine specimens; some with *cystocarpia.*

51. Rhodymenia palmata, *Grev.*; *Harv. Ner. Bor. Amer.* ii. p. 148.
On rounded pebbles, on an exposed beach, Esquimalt, *Dr. Lyall.* Also cast ashore, and on rocks at low water, in Fuca Strait, *Dr. Lyall.*

Common, and quite like the ordinary broad-leaved European form.

52. Rhodymenia corallina, *Bory*?
Dredged in 14 fathoms, St. Juan de Fuca, *Dr. Lyall.*

Fragments, apparently of this species.

53. Rhodymenia palmetta, *Grev.*; *Harv. Ner. Bor. Amer.* ii. p. 149.
Fuca Strait, on stones, *Dr. Lyall.*

A single specimen.

54. Ahnfeldtia plicata, *J. Ag.*; *Harv. Ner. Bor. Amer.* ii. p. 168.
Esquimalt, and Fuca Strait, *Dr. Lyall.*

55. Gymnogongri species.
Esquimalt, *Dr. Lyall.*

One small specimen with *favellidia.* It agrees in several respects with *G. linearis* (*Turn. Hist. Fuc.* t. 220), but is much smaller and more ramulous, and may be distinct.

56. **CYSTOCLONIUM GRACILARIOIDES**, n. sp. Fronde longissima simpliciuscula crassa alterne v. vage v. secunde ramosa, ramis cylindraceis basi vix attenuatis simplicibus omnino nudis v. ramulos perpaucos ferentibus, cystocarpiis?
Dredged in 10 fathoms, Esquimalt Harbour, *Dr. Lyall.*

Fronds 12–18 inches long, 1–1½ lines in diameter; very like the cord-like varieties of *Gracilaria confervoides,* but with the cellular structure proper to *Cystoclonium.* Lateral branches numerous, 5–6 inches long, patent, quite simple, mostly naked, rarely with a few ramuli. Fruit a desideratum.

57. **CALLOPHYLLIS FLABELLULATA**, n. s. Fronde pusilla (1–4-unciali) flabelliformi coccinea subdichotome v. digitatim multipartita et fastigiata, laciniis linearibus raro cuneiformibus patentibus sensim an-

gustioribus, apicibus acutis, cystocarpiis in discum v. ad marginem laciniarum sessilibus.

Dredged in 8–10 fathoms, and cast ashore, Esquimalt, *Dr. Lyall.*

The smaller specimens so exactly resemble *Euthora cristata*, that it is difficult to persuade oneself, without dissection of frond and fruit, that they belong to a different genus. The larger look like small varieties of *Callophyllis variegata*, and yet are not identical; some very narrow ones are equally like the narrow and dwarf states of *C. coccinea.* The colour is a bright red. The substance is somewhat rigid, but very imperfectly adhering to paper. The average width of the segments is 1–2 lines.

58. **Callophyllis variegata**, *Kütz. Sp. Alg.* p. 745.

Open beach, Esquimalt, *Dr. Lyall.*

A few small specimens. They are less fastigiate and broader than *C. flabellulata*, with more cuneate and obtuse or truncate segments, and of much softer substance.

59. **Callophyllis laciniata**, *Kütz.*; *Harv. Ner. Bor. Amer.* ii. p. 171; *Ph. Br.* t. 121.

Esquimalt, *Dr. Lyall.*

Fragments only.

60. **Constantinea Sitchensis**, *Post. & Rupr.*; *Harv. Ner. Bor. Amer.* ii. p. 173.

Adrift on the beach, Victoria Harbour, *Dr. Lyall.*

Perhaps this is only a luxuriant state of *C. rosa-marina.* The lamina in our specimens is torn, but must have been 6–8 inches in diameter when perfect.

61. **Kallymenia reniformis**, *J. Ag. Sp. Alg.* ii. p. 286.

Dredged in Esquimalt Harbour, 10 fathoms, *Dr. Lyall.*

A single specimen.

62. **Gigartina radula**, *J. Ag.*; *Harv. Ner. Bor. Amer.* ii. p. 178.

Fuca Strait and Victoria Harbour, *Dr. Lyall, C. Wood.*

63. **Gigartina mamillosa**, *J. Ag.*; *Harv. Ner. Bor. Amer.* ii. p. 175.

Var. *α. vulgaris.* Repetite ramosa, laciniis angustis cuneatis linearibusve.

Var. *β. latissima.* Parce dichotoma, laciniis latissime cuneatis truncatis.

Esquimalt Harbour, *Dr. Lyall.*

Between the broadest and simplest and the narrower forms there seems a direct passage; nor can I distinguish such varieties, more than similar states of *Chondrus crispus.* I have seen no authentic specimen of Agardh's "*G. papillata*" (from the Sandwich Islands); but his description agrees well with the broader and simpler of the Esquimalt specimens.

64. Gigartina mollis, *Bail. & Harv.*; *Harv. Ner. Bor. Amer.* ii. p. 175.
Rocks at low water, Fuca Strait, and dredged in 5 fathoms, *Dr. Lyall.*

65. Chondrus affinis, *Harv. Ner. Bor. Amer.* ii. p. 181.
Esquimalt, *Dr. Lyall.*

66. Iridæa cordata, *J. Ag.*; *Turn. Hist.* t. 116; *Ner. Bor. Amer.* ii. p. 180.
Esquimalt and Fuca Strait: common, *Dr. Lyall.*

Many specimens, of various ages, extremely varied in form; some with strictly cordate base, and others gradually passing off toward the obovate basally attenuated form called *I. laminarioides.* Substance in the younger plants thin and glossy, bright purple; in the older thick and fleshy, dull red-brown.

67. Endocladia muricata, *J. Ag.*; *Harv. Ner. Bor. Amer.* ii. p. 182, t. 28. B.
Rocks between tide-marks; Esquimalt, *Dr. Lyall*; in 5–9 fathoms, *C. Wood.*

68. Halymenia ligulata, *J. Ag.*; *Harv. Ner. Bor. Amer.* ii. p. 192.
Esquimalt Harbour, 4–6 fathoms, *Dr. Lyall.*

Two specimens only; a broad, flat, nearly regularly dichotomous form.

69. Halosaccion hydrophora, *Ag.*; *Harv. Ner. Bor. Amer.* ii. p. 194.
Esquimalt, on rocks and in tide-pools, *Dr. Lyall*; on floating wood, *C. Wood.*

Old fronds 10–12 inches long, 1–1½ inch in diameter. Injured specimens are frequently proliferous from the wound, or the broken sac throwing out numerous sacs from the side.

70. **PRIONITIS LYALLII**, n. sp. Fronde polymorpha membranaceo-coriacea siccitate badia sæpissime plana plus minus pinnatim et dichotome ramosa; nunc subsimplici lanceolata pinnis lanceolatis utrinque marginata; nunc ramosissima, ramis lineari-cuneatis, basi longe angustatis margine foliiferis pinnulatisve, pinnis ciliæformibus; nunc di-pollachotoma laciniis linearibus patentibus apicibus acutis v. explanatis.
Esquimalt, on tidal rocks and rock-pools, *Dr. Lyall*; Fuca Strait, *C. B. Wood.*

Between extreme states of this most variable species nothing but an extensive suite of specimens can suggest a connexion; and yet I find it impossible to fix limits to the following varieties:—

Var. *α. lanceolata.* Fronde 12–14 uncias longa, unciam lata, subsimplici lanceolata, pinnis minoribus foliaceis marginata et e disco prolifera.

Var. *β. ornata.* Caule compresso-filiformi tenui parce ramoso, ramis latissimis 6–8 uncias longis margine et disco foliiferis.

Var. *γ. normalis.* Fronde ramosissima digitato-pinnatim ramosa, ramis majoribus minoribusque lineari-cuneatis, basi angustatis, 2–4 uncias longis, 3–5 lineas latis, plus minus margine pinnulatis, pinnulis subhorizontalibus anguste linearibus v. apice dilatatis.

This seems to be the central or typical form of the species. The larger fronds are 12–14 inches in the expansion of the branches.

Var. δ. *densissima.* Fronde creberrime ramosissima pluries pinnatim ramosa, pinnis pinnulisque linearibus basi angustatis.

A narrower and more densely branched state than the preceding.

Var. ε. *intermedia.* Fronde ramosissima angustata, ramis superioribus plus minus dilatatis.

Between δ & ζ.

Var. ζ. *dilatata.* Fronde plus minus ramosa vix pinnulata, ramis superioribus dilatatis foliaceisve lanceolatis.

Var. η. *depauperata.* Parvula, debilis, sæpius di-pollachotoma et fastigiata.

Numerous other minor and connecting states might be named.

71. PRIONITIS LANCEOLATA? var. FILICINA. Fronde creberrime bitripinnata, pinnis pinnulisque horizontalibus.

On rocks, Esquimalt, *Dr. Lyall.*

Two specimens only. In substance, colour, and structure these specimens agree with the Californian *P. lanceolata,* than which, however, they are much more densely branched and more pinnated. I do not venture to propose them as specifically different.

72. Schizymenia Dubyi, *J. Ag.*; *Harv. Ph. Br.* t. 123.

On rounded pebbles, on an exposed beach, Esquimalt, *Dr. Lyall.*

Very similar to some of the larger English specimens.

73. Schizymenia Mertensiana, *P. & R.*? *J. Ag. Sp.* ii. p. 174.

Adrift, Victoria Harbour, *Dr. Lyall.*

A fragment only. The substance resembles parchment.

74. SCHIZYMENIA? COCCINEA, n. sp. Fronde.................maxima rubro-coccinea gelatinoso-membranacea tenui, siccitate chartæ arcte adhærente, structura laxa, filis medullaribus paucis arachnoideis.

Dredged in 14 fathoms, Griffin Bay, St. Juan Island, *Dr. Lyall.*

Fragments only, from which the outline can be but vaguely guessed at. The largest piece is about 16 inches long and a foot wide, and presents a bright-crimson, glossy, soft membrane closely adherent to paper. Its cellular structure is rather that of *Halymenia*; but the habit is more that of *Schizymenia,* where I provisionally place it.

75. Gloiosiphonia capillaris, *Carm.*; *Harv. Phyc. Bor.* t. 57.

On stems of *Nereocystis, Dr. Lyall.*

Two specimens only.

76. Microcladia Coulteri, *Harv. Ner. Bor. Amer.* ii. t. 33. A.
Rocks at low water, Esquimalt, *Dr. Lyall.*

77. Microcladia borealis, *P. & R.*; *Harv. Ner. Bor. Amer.* ii. p. 210.
Rocks at low water, Fuca Strait, *Dr. Lyall.*

78. Ceramium cancellatum, *Ag.*
Rocks and larger Algæ, at low water, Esquimalt, *Dr. Lyall.*

79. Ceramium rubrum, *Ag.*; *Ner. Bor. Amer.* ii. p. 213.
Esquimalt, *Dr. Lyall.*

80. Ceramium diaphanum, *Ag.*; *Ner. Bor. Amer.* ii. p. 215.
Rock-pools, Esquimalt and Port Roberts, *Dr. Lyall.*

81. Ceramium tenuissimum, *Ag.*; *Ner. Bor. Amer.* ii. p. 216. (C. nodosum, *Kütz.*)
Dredged in 10 fathoms, Esquimalt, *Dr. Lyall.*

82. Ptilota Californica, *Rupr.*; *Ner. Bor. Amer.* ii. p. 222.
Esquimalt, *Dr. Lyall.*

Fragments only, much battered.

83. Callithamnion arbuscula, *var.* Pacificum. (C. Pikeanum, *Harv. Ner. Bor. Amer.* ii. p. 230.)
Tidal rocks, Esquimalt, *Dr. Lyall.*

The specimens so nearly coincide with Orkney specimens of the European *C. arbuscula* that I cannot keep them specifically apart. The branching of the ramuli is less pectinate and more regularly pinnate than in the specimen from California on which my "*C. Pikeanum*" was founded.

84. Callithamnion polyspermum, *Ag.*; *Harv. Ner. Bor. Amer.* ii. p. 234.
On rocks, Esquimalt, *Dr. Lyall.*

85. Callithamnion thuyoideum, *Ag.*; *Phyc. Brit.* t. 269.
On dead shells, in 10 fathoms, Esquimalt, *Dr. Lyall.*

There are several specimens of this elegant species, very closely similar to those from the West of Ireland, in Herb. T. C. D. One of Dr. Lyall's shows a tendency to pass into "*C. tripinnatum*" or *C. gracillimum.*

86. Callithamnion Americanum, *Harv. Ner. Bor. Amer.* p. 238, t. 36. A.
On stems of *Nereocystis,* and dredged in 8–10 fathoms, Esquimalt, *Dr. Lyall.*

87. CALLOTHAMNION SUBULATUM, n. sp. Fronde rigidiuscula erecta alterne decomposita ramosissima, ramis ramulisque opposite pinnatis; pinnis subulatis acutissimis, junioribus nudis, adultis basi intus ramulo multifido auctis demum fasciculato-ramulosis; tetrasporis triangule divisis ad ramulos secundarios sessilibus.
On small stones, sandy beach, Esquimalt, *Dr. Lyall.*

More rigid than *C. Americanum,* but seemingly intermediate between the less ramulose states of that species and the following. The larger are 6–8 inches long and broad, their divisions having a pyramidal outline.

88. **Callithamnion floccosum, var. pacificum.** Pinnis omnibus longis filiformi-subulatis simplicissimis.
On stems of larger Algæ, Orcas Island and Esquimalt, *Dr. Lyall.*

Much more densely branched and with much longer pinnæ than the usual Atlantic variety, and with more the aspect of *C. Americanum*; but some Scotch specimens in Herb. T. C. D., by the length of their pinnæ and general habit, come near the present.

CHLOROSPERMEÆ.

89. Codium tomentosum, *Harv. Ner. Bor. Amer.* iii. p. 29.
Esquimalt Harbour, &c., on rocks, *Dr. Lyall.*

90. Porphyra vulgaris, *Ag.*; *Ner. Bor. Amer.* iii. p. 53.
On rocks and Algæ, Esquimalt, &c., common.

Several varieties. Some are 3–4 feet long, and 1 foot wide; others are beautifully marbled with green and purple.

91. Enteromorpha compressa, *Link*; *Harv. Ner. Bor. Amer.* iii. p. 57.
On rocks and dredged, Esquimalt, &c., very common.

92. Enteromorpha intestinalis, *Link*; *Ner. Bor. Amer.* iii. p. 57.
Strait of Georgia, in 8 fathoms, *C. B. Wood.*

93. Ulva latissima, *Linn.*; *Ner. Bor. Amer.* iii. p. 59.
Esquimalt, &c., common.

94. Ulva fasciata, *Del.*; *Ner. Bor. Amer.* iii. p. 58.
Pools between tide-marks, outer sea-coast and adrift, *Dr. Lyall.*

95. Ulva rigida, *Ag.*
Esquimalt, *Dr. Lyall.*

96. Ulva Linzæ, *Ag.*; *Ner. Bor. Amer.* iii. p. 59.
Rock-pools, Esquimalt and Orcas Island, *Dr. Lyall.*

97. Vaucheriæ sp.
In running streams, Esquimalt and Lake Schweltza, *Dr. Lyall.*

The species is not determinable from dried specimens.

98. Batrachospermum moniliforme, *Ag.*
Stones in running streams, Chilukweynk Valley, *Dr. Lyall.*

99. Cladophora arcta, *Phyt. Br.* t. 135; *Ner. Bor. Amer.* iii. p. 75.
Orcas Island, Esquimalt, &c., *Dr. Lyall & C. Wood.*

100. Cladophora glaucescens, *Griff.*; *Ner. Bor. Amer.* iii. p. 77.
Nanaimo, Vancouver's Island, *C. Wood.*

101. Cladophora lætevirens, *Dillw.*; *Ner. Bor. Amer.* iii. p. 82.
Fuca Strait, *Dr. Lyall.*

Young specimens, about an inch in height.

102. Cladophora glomerata, *Linn.*; *Ner. Bor. Amer.* iii. p. 84.
Lake Scheveltza, *Dr. Lyall.*

103. Conferva rivularis, *Ag.*
In running streams, Sumas Prairie, Br. Columbia, *Dr. Lyall.*

104. Conferva floccosa, *Ag.*
In pools above high water, Esquimalt, *Dr. Lyall.*

105. Zygnematis sp.
Pools, Esquimalt.

A moderately robust species, with short joints.

106. Hormotrichum Carmichaelii, *Harv.*; *Ner. Bor. Amer.* iii. p. 90.
Rock-pools between tide-marks, Fuca Strait, *Dr. Lyall.*

107. Hydrurus penicillatus, *Ag.*; *Ner. Bor. Amer.* iii. p. 118.
On stones in streams, Chilukweynk Valley, *Dr. Lyall.*

On the Discovery of *Gladiolus Illyricus* (Koch) in the Isle of Wight. By ALEXANDER G. MORE, F.L.S.

[Read April 3, 1862.]

THROUGH the kindness of my friend the Rev. E. Venables, I have lately obtained the loan of a specimen and drawing of a wild *Gladiolus* gathered by a lady near Shanklin, in the Isle of Wight; and in answer to some inquiries addressed to her, Mrs. Phillipps, the discoverer, has informed me that it was found growing in the midst of a wild tract of copse and heath, called the "Apse" or "America" woods. Only one plant was noticed: it was in bud on the 7th of July 1855, and, having been carried home, afterwards flowered, when the drawing was made.

The *Gladiolus* found at Shanklin evidently belongs to the same species as that which grows in the New Forest, as I have ascertained by comparing Mrs. Phillipps's specimen with a series collected at Lyndhurst, by Mr. John T. Syme; but in the characters afforded by the stigma, whose lobes are suddenly (not gradually) enlarged upwards, the English plant from both localities appears to agree better with *Gladiolus Illyricus* (Koch) than with either *G. imbricatus* (Linn.) or *G. communis* (Linn.); and I therefore venture to propose a change of name, which, I am glad to say, has the approval of my friend Professor Babington, who further allows me to state that he finds the English *Gladiolus* to agree exactly with Continental specimens of *G. Illyricus* issued by C. Billot.

Gladiolus communis (Linn.) is a much larger plant, and is easily distinguished from the other two species by its larger flowers and much stouter leaves. The range also of *G. communis* appears to be more exclusively southern in Europe.

It will be remembered that Dr. Arnott, in the latest edition of the British Flora, treats "*Gladiolus communis*" as an introduced plant. Mr. Bentham, also in his 'Handbook,' writes, "Possibly accidentally introduced;" but I believe that the occurrence of *Gladiolus Illyricus* in the Isle of Wight supplies an important link in support of its being indigenous to Britain.

There can be no doubt as to the identity of the present specimen. Fortunately, the finder noted down the date in her journal at the time, and made a drawing of the plant while it was still fresh. Further, there is a tradition on the spot: it has long been known to the inhabitants of a neighbouring farm-house that a wild *Gladiolus* grows in the woods at Shanklin.

The specimen now exhibited was found in the middle of the wood, in a spot remote from cottages; nor am I aware that *G. Illyricus* is at all cultivated as a garden-flower.

The nature of the British stations (heaths and heathy woods) agrees perfectly with what is known of the place of growth of *G. Illyricus* in the north-west of France.

If *G. Illyricus* appears to belong to the south and west of Europe, its position in Britain is not unlike that of several other species which, though absent from North and Middle Germany, extend along the shores of the Atlantic as far as the British Isles. *Arum Italicum*, *Rubia peregrina*, *Cyperus longus*, *Agrostis setacea*, &c. will readily occur as examples of this; and no doubt all these plants are influenced by the comparative mildness of the maritime climate of the west of Europe.

If very rare in Hampshire and in the Isle of Wight, *G. Illyricus* is also said to be exceedingly scarce in the Loire district of France, as indeed might be expected from its outlying position in both countries, where we may suppose it to be at the extreme limit of its range.

It is hoped that any botanist who may succeed in discovering other plants at Shanklin will not fail to publish the details, since, however great the geographical probabilities of its wildness, it would be very desirable to have more than a single root to vouch for *Gladiolus Illyricus* being indigenous to the Isle of Wight.

Florula Mallica. By M. P. EDGEWORTH, Esq., F.L.S.

[Read May 1, 1862.]

THE paper which I now offer to the Society is the result of my botanical observations in the Multan division of the Punjab, where the Malli resided in the time of Alexander. During an official residence of five years, I have visited every portion of it, but unfortunately not always at the most favourable season for botany; therefore further explorations may add some other species to the somewhat meagre flora now to be described, particularly in the northern portion. It is, however, interesting as a region of botanic geography osculating between that of the North-west of India and that of Sindh and Arabia.

The Multan division, comprising the districts of Jhung, Gogaira, and Multan (15,494 square miles, of which only 1221 are cultivated), is a tolerably natural one as a botanical sub-section. It is triangular, bounded on the south by the Sutlej, on the west by the Jhilum and the Chenab after their junction, except for a short distance, where the boundary is the edge of the Sandy Desert (or Thall) of the Sind Sāgar Doab, on the north-east by an irregular line running from Kot Isa Shah across the Vichan Doab (often termed by us, though not by the inhabitants, the Chaj or Jech) to a little above Chandniot, and thence in a nearly straight line to the Sutlej, nearly opposite Mamdot. It thus embraces some of the detached hills which form the remarkable ranges which shoot up suddenly out of the plain, rising to the height of 1000 feet at Kirana in the Vichan Doab, and finally descend near Shahkot in the Rechnab. Those near Chandniot are about 400 feet, and at Shahkot not about 150. They consist of sandstone and slate, and are very barren.

Thus the division consists of the lower extremities of the three Doab—the Vichan, Rechnab, and Bari. We might include the Bīst also; but the total drying of the old Beas has obliterated that distinction, as obtained in the Ayin Akbari in the 16th century.

Each Doab consists of two distinct portions, the cultivated strip of low land bordering the rivers (Kăchhi) and the central higher land (*Bār*). This word appears to be a corruption of the Arabic *barr*, which is defined by Col. Chesney, in his 'Euphrates,' to be a dry desert of hard clay, more or less covered with bushes and grass. The term was probably applied by the Arab conquerors, who have left traces of their language in the village dialect, in several Arabic words not usually in the Urdū.

The Bār may further be considered as twofold; that more properly so called is raised some thirty to fifty feet above the lower land.

The Bār proper, when seen at the close of a favourable rainy season, is very pleasing—a rich carpet of grass dotted over with bushes or large trees, mostly *Salvadora* or *Tamarix*. The soil is hard, and in a few places there are dunes of blown sand (as in the Thall), and occasionally tracts of sodiferous soil which produces nothing almost but *Salsolaceæ*.

The Bār improper is intersected by the remains of deserted water-courses (arid branches of the several rivers). It is either densely clothed with a jungle of *Jhund* (*Prosopis*) or *Tamarix* both *orientalis* and *Gallica*, or consists of almost perfectly bare open tracts of clay, sometimes sodiferous, causing friable soil, the dust of which will fall like water in drops, sometimes with sand-dunes, generally thinly clothed with the grey *Anabasis multiflora*, which toward the Chenab seldom exceeds two feet in height, while towards the Sutlej it often is five or six, making a small bush with ramifications not unlike a miniature oak, and not unpleasing to the eye when in fruit, when the winged calyces are often of a bright rose-colour.

In the lower part of the Bari Doab, forming the district of Multan, the Bār is intersected by innumerable long, low mounds, the remains of ancient canals from the Ravi, Chenab, and Beyas, which, gradually silting up, have raised themselves above the level of the country, and finally, probably owing to the change of the course of the latter river, been quite deserted. Towards the south of the district there are several ranges of low dunes of drifting sand which have a peculiar vegetation of their own.

The *Kăchhi*, or irrigated portion of the district, produces very fine crops of cereals, sugar-cane, and indigo, particularly on the Chenab. There are also extensive groves of the date-palm, which was introduced by the Arabs in the eighth century. The usual weeds of cultivation appear in the winter, not only those common to the Punjab and North-west Provinces, but from Persia and Affghanistan, that do not cross to the Sutlej, as *Hypecoum* and *Goldbachia*. It is well wooded, principally with *Acacia Arabica* and *Lebek* (the former of enormous size and height) and *Dalbergia Zizyphus*. Wherever irrigation penetrates, the produce is very great; without it, very little will grow. In some places there are only wells for the purpose; but throughout the Kăchhi they have the advantage of inundation-canals from the rivers, which fill their water-courses about the beginning of May, just after the spring crop (Rabi) has been brought in. Consequently the cotton or millet is sown earlier than is the practice where they are dependent only on the rain-fall in June or July.

The climate is excessive, varying from 120° in the shade to 21°, the lowest that I have observed it. During winter, the temperature falls to the freezing-point every night that is clear. There are frequent showers during the season. Hail occasionally falls, principally in March or April. In May the hot winds commence. They blow from the south, instead of west or north-west as is the case in Hindostan. This wind continues more or less during the whole summer. The east wind is rare; but in some years heavy rain accompanies that wind, as in the North-west Provinces: on such occasions the "Băr" is clothed with verdure: but this cannot be depended upon, and for several years in succession there may be no rain-fall at that season; consequently the smaller semitropical annuals which abound in other parts of India are but rare, especially the *Acanthaceæ*.

Water-plants are extraordinarily rare, though there are so many stagnant and semi-stagnant branches of the rivers. I have observed but seven, two of them very rare (*Limnanthemum* and *Nymphæa*), while there is a total absence of the *Lentibulariæ*, *Alismaceæ*, *Naiades*, and *Charæ*, all of which abound in the region immediately to the north and west, so much so that the natives at Multan are unable to clarify their molasses, from the want of the "Jhanjh" or *Hydrilla*, and other *Naiades*, which are used for the purpose of "claying" in other parts of India.

The whole Phanerogamic flora is but 334, exclusive of 113 only cultivated.

There are 34 species riparious, including those which enjoy partial submergence.

There were 32 annual weeds of cultivation in the cold season (Rabi), 33 in the summer and autumn, including those which prevail at all seasons, being 9, 2, and 10 per cent. respectively.

Including all shrubs, trees, and woody climbers, I find but 43, being 13·3 per cent.

I find no less than 78 species peculiar to our deserts. Among these the following are collected by the poorer classes, especially the nomadic tribes who inhabit the "Băr." The women sweep up the fallen seeds by a whisk into straw baskets resembling our dust-pans. *Tribulus alatus*, *Zygophyllum simplex*, *Trianthema*, *Boerhaavia elegans*, *Agrostis scabrifolia*, *Panicum colonum* and *Hydaspicum*, *Cenchrus*, and *Pennisetum*.

It is a curious sight to see the numbers that go out from the villages into the desert to collect and eat the fruit of the *Salvadora oleoides*, called *Pīlū*, and the *Capparis* (*Sodada*) *decidua*.

The late Dr. Stocks kindly communicated to me a list of his Sindh flora: there are only 19 Mallic plants, or 94·3 per cent., not common to Sindh; there are 76, or 77·7 per cent., not observed in the cis-Sutlej States by myself in 1834–8. No less than 227, or nearly 65 per cent., are common to North Africa and Arabia; 83, or nearly 25 per cent., are European, while 73·3 per cent. are common to India proper, exclusive of the Punjab and Sindh. The most remarkable forms were *Pappophorus*, *Stipagrostis*, *Cressa*, *Frankenia*, *Limneum*, *Dipterygium*, and *Neuroda*.

Among the Cryptogamic flora we have but four, exclusive of fungi, *Marsilea*, an *Equisetum*, *Adiantum Capillus-Veneris*, and a *Phascum*. There are a few fungi found, and two of them are edible—one resembling a morel, called *Kumbha*, which is found in profusion in the Rechnab Desert, and which is much liked by the natives and those of my European friends who have had the opportunity of tasting it, which I myself have not. The other is subterraneous, found in cultivated land near Multan, and called *Boenphul*, or earth-fruit, which I do not at all like. Unfortunately my collection of fungi was lost; therefore I cannot enumerate the species.

Lastly, I may point out the paucity of species in this flora—only 338, exclusive of *Cellulares*, in an area exactly the half of Ireland (in which Dr. Mackay enumerates 1057 in his 'Flora Hibernica')—little more than what I collected in Banda, $\frac{1}{5}$th of its area. These species are distributed in 67 orders, exactly five, on an average, in each order; and in 226 genera, giving an average of 1·5 to each genus,—very much less even than remarked upon by Dr. T. Anderson in his 'Aden Florula.' There are very few genera of more than three species. *Eragrostis* has ten; *Aristida*, 9; *Panicum*, 8; *Heliotropium*, 7; and *Corchorus*, 6.

I append descriptions of those species which have not been published, or which call for remark. There are some three or four which I cannot agree in uniting as Dr. Anderson did. My reasons I have given in detail in the notes.

In fine, I beg to offer my thanks for the valuable assistance afforded to me at Kew by our President, Dr. Hooker, Professor Oliver, and Mr. Black.

FLORULA MALLICA.

THALAMIFLORÆ.

RANUNCULACEÆ.

Ranunculus sceleratus, *L.* 776. Not very common.

MENISPERMACEÆ.

Cocculus villosus, *DC. Prodr.* i. 98. Common towards the north, rarer towards the south.

—— Leæba *a*, *DC. P.* i. 99. *a.* A lofty climber: rare.

—— —— *β.* tomentosa. *β.* Prostrate on rocks at Shahkot, &c.

Anamirta Cocculus. *Cultivated.*

NYMPHÆACEÆ.

Nymphæa Lotus *γ.* pubescens, *L.* Rare.

NELUMBIACEÆ.

Nelumbium speciosum, *DC. P.* i. 311. *Cult.*

PAPAVERACEÆ.

Papaver album, *L.* 726. *Cult.*

Argemone Mexicana, *L.* 727. Gradually spreading from the north downwards. It had not reached Multan in 1854.

Hypecoum procumbens, *L.* 180 (*Chiazospermum pendulum,* Bernhardi). The Punjab form has larger leaves than the European and Levant forms. The siliques are sickle-shaped and not pendulous.

Fumaria parviflora. Very abundant.

CRUCIFERÆ.

Farsetia Edgeworthii, *H.f. & T. Linn. Journ.* v. p. 147. Chandniot Hills.

—— Jacquemontii, *H.f. & T. l. c.* p. 148. Most abundant. (Punjabi, *Farid muri.*) Pleasant biting taste: considered a specific for curing rheumatism.

—— Hamiltonii, *Royle.* Principally towards the north-east.

Cochlearia flava (*alyssoides*). River-banks, towards north and east.

Malcolmia Africana, *L.* (*Arabis arvensis,* Edgew. Linn. Trans.). Only to the north.

Sisymbrium Irio, *L.* Fields.

—— irioides, *Boissier.* Fields. Boissier describes *irioides* as larger than *Irio,* whereas this is rather smaller, and as having white petals, whilst those of this are dirty yellow.

—— —— *β.* or nitidum? A much more delicate plant. In the Rechnab Bar or desert, and on the rocks at Chandniot. I should rather refer it to *S. nitidum.*

Lepidium sativum, *L.* *Cult.*

Brassica Rapa, *L.* Extensively cultivated. The roots sliced and dried in the sun.

—— Stocksii, *H.f. & T.* I have only rarely observed this accidentally in fields: not cultivated.

—— Eruca, *L.* Much cultivated for its oil.

—— (*Sinapis*) campestris, *L.* *Cult.* "*Sarson.*"

—— juncea, *L.* *Cult.* "*Rai.*" These native names have been accidentally transposed in the paper in the Linn. Journ. v. pp. 169, 170.

Goldbachia lævigata, *DC.* Corn-fields, only towards the north-west.

Dipterygium glaucum, *Dcn. Fl. Sinaica.* Sand-hills to the south.

Raphanus sativus, *L.* *Cult.* The siliques boiled as a pot-herb—not the root.

RESEDACEÆ.

Oligomeris glaucescens, *Dcn.* *Jacqt.* t. 25 (*Reseda oligandra,* J. A. S. vii. p. 764).

CAPPARIDEÆ.

Capparis spinosa (*obovata,* Royle), *Jacqt.* t. 21. I find no description of the dehiscence of the fruit in any European Flora. It is noted by Decaisne in Jacquemont. When ripe the skin separates and curls up in three or four segments like a *Martagon,* showing the seeds immersed in crimson pulp. It is found abundantly at Multan, but not in the next region northward, and appears again in the confined valleys of the Sutluj, Beyas, &c., as far as the Indus at Iskardo. The fruit is pickled by the natives. I preserved the buds in the European style and found them first-rate.

—— decidua (*Sodada,* Forsk.) (*aphylla,* Roxb.). Most abundant: much used for firing, as it burns with a gaseous flame. The largest individual I have observed was near Chichawatni, at Jhangbiabani, 8 feet in girth.

Cratæva Roxburghii. *Gardens.*

Cadaba Indica. Rocks at Chandniot.

Cleome papillosa (*C. gracilis,* Edgew. J. A. S.).

—— brachycarpa, *DC.* (*C. Ruta,* Dcn. in Jacquemont, t. 19).

Polanisia viscosa. Fields.

Gynandropsis pentaphylla. Fields, and in the desert. Eaten as a vegetable. (*Gandhūli,* Ind.)

POLYGALACEÆ.

Polygala (Blepharidium) erioptera, *DC.*—See note, p. 199.

ELATINACEÆ.

Lancretia æstivosa, *W. A.* The flowers are as often twin as solitary. The carpels are very often destroyed by a small Cerambyx.

Bergia ammannioides.

CARYOPHYLLACEÆ.

Vaccaria parviflora. Corn-fields.
Silene conoidea. Ditto.
Stellaria media. Ditto.
Stipularia flaccida, *Roxb.* This differs not only in its decandrous flowers, but in the seed, which is broadly winged. In *pentandra* the seed is scrobiculate and scarcely winged, while in *fallax* the seed is a compressed sphere without any wing.
Spergularia rubra. Fields.
Polycarpæa corymbosa. Fields.

PORTULACACEÆ.

Portulaca meridiana. Gardens and desert.
—— quadrifida. Ditto ditto.
—— oleracea. Cultivated as a vegetable.

MOLLUGINEÆ.

Mollugo Cerviana. Fields and desert.
—— nudicaulis. Ditto ditto.
Orygia trianthemoides. Chandniot, &c.
Glinus lotoides. Desert.

FRANKENIACEÆ.

Frankenia pulverulenta. In sodiferous soil, but rare.

MALVACEÆ.

Abutilon Indicum. (Ind. *Abut kanda.*) Used in coughs.
Sida cordifolia.
—— grewioides, *Guil. & Per. Fl. Seneg.* 71. This differs from the African form in the petioles being longer, and the pedicels ½ to 1 inch long, not *subsessile* as described. The carpels are rugose on the back and shortly beaked.
—— humilis.
Malva vulgaris.
—— parviflora.
Althæa Ludwigii.
Hibiscus micranthus, *Linn.* Chandniot hills.
—— laguneoides. In cotton-fields.—See description, p. 199.
Abelmoschus esculentus.
Gossypium herbaceum. *Cult.*

TILIACEÆ.

Corchorus depressus (*Antichorus*), *L.*
—— trilocularis.
—— olitorius.
—— capsularis.

Corchorus fascicularis.
Grewia Asiatica. Gardens.
—— populifolia? Bār. (*Gangher*, Ind.)
Triumfetta rotundifolia.

MELIACEÆ.

Melia composita. *Cult.*
Azadirachta Indica. *Cult.*

SAPINDACEÆ.

Cardiospermum Halicacabum.

AMPELIDEÆ.

Cissus carnosa.
Vitis vinifera. *Cult.*

GERANIACEÆ.

Monsonia Mallica. Perhaps a var. of *Erodium niveum*, Decaisne.—See description, p. 200.

OXALIDEÆ.

Oxalis corniculata.

ZYGOPHYLLACEÆ.

Zygophyllum simplex. Seeds eaten in the desert. Called "*Alethi*," as well as *Trianthema*.
Tribulus alatus. Seeds eaten in the desert. Called "*Bhūkri*."
—— lanuginosus.
Fagonia Cretica, *Linn.* (*Arabica, Mysorensis,* &c.). Very variable, with simple and ternate leaves.

RUTACEÆ.

Peganum Harmala. Desert.

CALYCIFLORÆ.

RHAMNACEÆ.

Zizyphus nummularia. Not very plentiful.
—— Jujuba β. hortensis. The wild species does not reach this region, as far as I have observed.
—— —— γ. Hysudricus.—See note, with description, pp. 200–202.
—— Spina-Christi.
—— vulgaris. In gardens: rare.

ANACARDIACEÆ.

Mangifera Indica. *Cult.*: peculiarly delicious in Multan.

MORINGACEÆ.

Hyperanthera pterygosperma. *Cult.*

LEGUMINOSÆ.

Edwardsia Hydaspica. Gardens at Multan, from the Salt range.
Crotalaria Burhia. Desert.
Lotus corniculatus. Damp sand by the rivers.
Trigonella Fœnum-græcum. *Cult.*
—— incisa.
Melilotus leucantha.
—— parviflora.
Medicago lupulina.
Cyamopsis psoraleoides. *Cult.*
Psoralea plicata. (*Bakhtmal,* Ind.) Camels delight in it.
Indigofera linifolia.
—— cordifolia.
—— enneaphylla.
—— ornithopodioides, *Schimp.* This seems to me different from *Senegalensis.*
—— tinctoria. *Cult.*
—— paucifolia. The Indian form is more torulose than the African.
Macronyx stricta, *Dalz.* (*Tephrosia tenuis,* Wall. Cat.).
Tephrosia purpurea. Rare, though so abundant in the Cis-Sutluj.
Clitoria Ternatea. *Cult.*
Sesbania Ægyptiaca. *Cult.*
—— aculeata. Fields.
Astragalus contortuplicatus.
—— tribuloides.
—— prolixus.
Alhagi Maurorum.
Æschynomene Indica.
Cicer arietinum. *Cult.*
Ervum Lens. *Cult.*
—— hirsutum. Fields.
Vicia sativa (*angustifolia,* DC.). Fields.
Pisum sativum. *Cult.*
Lathyrus sativus. *Cult.*
—— Aphaca.
—— sphæricus, *Retz.* (*angulata*). Fields.
Abrus precatorius. Jungle.
Rhynchosia medicaginea. Jungle.
—— sericea. Jungle.
Phaseolus Mungo (*Roxburghii,* W. & P.). *Cult.*
—— aconitifolius. *Cult.*
Dolichos Lablab. *Cult.*
Canavalia gladiata. *Cult.*
Dalbergia Sisoo. Wild and *cult.*
Butea frondosa. Rare, and only towards the north.
Erythrina Indica. *Cult.*
Prosopis spicigera. Most abundant.

Acacia Farnesiana. *Cult.*

—— Jacquemontii.

—— Arabica. Both the common and the cupressiform: sometimes both varieties on the same tree. It grows to a much larger size than in the N.W.P. I have measured one 16 feet 4 inches in girth, and several 11 or 12 feet.

—— modesta. Only towards the north.

Albizzia Lebec. *Cult.*: never, apparently, wild.

Cathartocarpus Fistula. *Cult.*

Cassia suffruticosa. *Cult.*

—— Tora.

—— Sophera. Rare.

Bauhinia variegata. *Cult.*

Tamarindus Indica. *Cult.*: very rare.

ROSACEÆ.

Potentilla supina.

Rosa Indica. *Cult.*

—— Damascena. *Cult.*

Neuroda procumbens. Sand-hills.

Amygdalus Persica. *Cult.*

—— vulgaris. *Cult.*

Pyrus Malus. *Cult.*

Cydonia. *Cult.*

GRANATEÆ.

Punica Granatum. *Cult.*

SALICARIEÆ.

Lawsonia alba. *Cult.* both in gardens and at a few places (*e.g.* Mailsian) in fields for the dye.

Ammannia vesicatoria.

—— multiflora.

Ameletia rotundifolia.

Rotala Roxburghii.

TAMARISCINEÆ.

Tamarix dioica. Called "*Lai.*"

—— Gallica. Called "*Pilchi.*" Occasionally producing manna.

—— orientalis (*Faras*, Royle). Called "*Pharma.*" Generally covered with salt, so much that poor people dip it in water to season their bread. The wood when burnt is most offensive and stercoraceous. It grows with great rapidity. I have measured trees of six or seven years' growth 5 feet in girth, and they fall down of old age at twenty years.

CUCURBITACEÆ.

Cucumis trigonus. Desert.

—— pubescens. Wild.

—— —— Melo. Many varieties of the Musk Melon, of great excellence.

Cucumis usitatissimus. "*Kakri.*"
—— cicatrisatus, *Stocks.* "*Albinda.*"
—— Momordica. "*Pūnt.*"
Citrullus vulgaris. *Cult.*
—— fistulosus (*St.*). *Cult.* H. J. B. iii. p. 74.—See description, p. 202.
—— Colocynthus.
Luffa pentandra. *Cult.*
—— acutangula. *Cult.*
Lagenaria vulgaris. *Cult.*
Momordica Charantia. *Cult.*, and wild in sand-hills.
Mukia scabrella.

I have not observed any species of *Trichosanthes* or *Coccinia,* which are common in Sirhind and Lahore.

AIZOONEÆ.

Trianthema pentandra, *Linn.* "*Itsit.*"—See description, p. 202.
—— crystallina, *Forsk.* "*Alethi.*" The seeds are swept up on the bare hard soil on which it grows and eaten in times of scarcity. It covers miles of the desert, particularly in the Rechnab Bār.—See description, p. 203.
—— Hydaspica.—See description, p. 203.

UMBELLIFERÆ.

Anethum Sowa.
Petroselinum sativum.
Ptychotis Ajwain.
Coriandrum sativum. Wild, among pulse fields.

RUBIACEÆ.

Hedyotis Burmanniana.
Wendlandia cinerea. Two stray specimens carried down by the Jhilum and Chenab, and growing wild.

COMPOSITÆ.

Vernonia cinerea.
Berthelotia lanceolata.
Grangea Ægyptiaca.
Blumea, sp. ——.
Eclipta prostrata.
Francœuria crispa.
Xanthium Strumarium.
Myriogyne minuta.
Trichogyne cauliflora.
Echinops echinatus.
Microlonchus divaricatus.
Cirsium arvense.
Carthamus Oxyacanthus. Not so common as in Sirhind.
—— tinctorius. *Cult.*

Microrhynchus sarmentosus.

—— nudicaulis.

Sonchus oleraceus. Rare (sand-hills).

—— Candollianus (*Zollikoferia,* DC.). The pappus is remarkable, and very different from that of the normal *Sonchi.*

Cichorium Intybus. *Cult.*

Lactuca sativa. *Cult.* for the seeds, which are used as a medicine.

COROLLIFLORÆ.

PRIMULACEÆ.

Anagallis cærulea.

SAPOTACEÆ.

Mimusops Elengi. *Cult.* A tree in the Huzūri Bagh, Multan; said to have been brought by the late Nawab of Multan from Mecca.

—— Kauki. *Cult.*

APOCYNEÆ.

Nerium odorum. *Cult.*

ASCLEPIADACEÆ.

Leptadenia Jacquemontii.—See note, p. 204.

Dæmia extensa.

Calotropis procera (*Hamiltonii*). In Bari Bār grows quite arboreous, 1½ feet in girth.

Pentatropis spiralis. The Punjab and Sindh plant is this species—not *microphylla.*—See note, p. 204.

Periploca aphylla.

Oxystelma esculentum.

Ceropegia esculenta. Both the tubers and leaves eaten as a vegetable. (*Gahlōt,* Ind.)—See description, p. 204.

Boucerosia edulis. Eaten as a vegetable. (*Situn,* Ind.)—See description, p. 205.

GENTIANACEÆ.

Limnanthemum Kleinianum.

Slevogtia orientalis.

BIGNONIACEÆ.

Tecoma undulata (*Jacq.*). Rare, but found both in Rechnab and Bari deserts. (*Lahúra,* Ind.)

CONVOLVULACEÆ.

Cressa Cretica.

Convolvulus arvensis. Fields: remarkably large and sweet-scented.

—— pluricaulis. Desert.

Batatas pentaphylla. Rechnab Bār.

Ipomæa Pes-Tigridis.

—— sessiliflora. With a variety.

—— reptans. Not common.

Pharbitis Nil.

Rivea hypocrateriformis.

Cuscuta reflexa.
—— planiflora. Found in a field of Cashmir lucerne at Gogaira.

CORDIACEÆ.

Cordia Myxa. *Cult.*
—— subopposita. *Cult.*

BORAGINEÆ.

Ehretia serrata. In the Bār.
Heliotropium supinum.
—— Europæum.
—— bicolor.—See note, p. 205.
—— ramosissimum.
—— marifolium.
—— strigosum.
—— brevifolium.
Tournefortia subulata (*Edgeworthii,* DC.).
Arnebia hispidissima.
Nonnea Edgeworthii.
Trichodesma Africanum.
—— Indicum.
Anchusa hispida.

SOLANACEÆ.

Lycium Europæum (*Edgeworthii,* DC.).
Withania somnifera.
—— coagulans (*Puneeria,* Stocks). (Ind. *Akri*: the fruit *Panni* or *Panir.*)
Solanum xanthocarpum.
—— gracilipes. Rechnab Bār.
—— nigrum.
—— Melongena. *Cult.*
Datura fastuosa. *Cult.*
Capsicum ——. *Cult.*

SPHENOCLEACEÆ.

Pongatium Zeylanicum.

SCROPHULARINEÆ.

Doratanthera linearis. Desert.
Antirrhinum Orontium. Fields.
Linaria ramosissima. Chandniot.
Celsia Coromandeliana. Edges of rivers.
Herpestes Monieri. Ditto.
Mazus rugosus. Ditto.
Lindenbergia urticifolia.
—— macrostachya. Chandniot.
Veronica Buxbaumii. Fields and gardens.
—— Anagallis. Edges of rivers.
Striga euphrasioides.

OROBANCHEÆ.

Phelipæa Calotropidis. On the roots of *Calotropis* only. Differs from *lutea* in the anthers, which are mucronate, while in this they are obtuse.

LABIATÆ.

Ocymum Basilicum. *Cult.*
—— sanctum. *Cult.*
Mentha incana? *Cult.*
Salvia pumila. Edges of rivers.
—— plebeia. Ditto.
Leucas urticifolia. Rechnab Bār.
Dracophyllum Royleanum. *Cult.*

VERBENACEÆ.

Verbena officinalis.
Lippia nodiflora.
Clerodendron phlomioides.
Vitex bicolor.

ACANTHACEÆ.

Dipteracanthus patulus. Chandniot and Shahkot rocks.
Barleria ciliata. Ditto.
Acanthodium spicatum. Desert.
Peristrophe bicalyculata. Only once found.

PLUMBAGINEÆ.

Plumbago Zeylanica.

SALVADORACEÆ.

Salvadora oleoides. Most abundant: the fruit much eaten in the desert. 12 feet in girth at Thannam; at Baluana 11 feet 4 inches. (Ind. *Van*: the fruit is *Pīlū*.)

—— Indica. Rare: leaves eaten as a salad. At Pakpatan 14 feet 9 inches in girth.

PLANTAGINEÆ.

Plantago amplexicaulis.
—— Ispagula. *Cult.*

MONOCHLAMYDEÆ.

PHYTOLACCACEÆ.

Limeum Indicum, *Stocks, in Anderson, Fl. Adenensis, Linn. Journ.* v.—See description, p. 206.

Giesekia pharnaceoides.
—— rubella.

SALSOLACEÆ.

Beta vulgaris. *Cult.*
Chenopodium murale.
Spinacia oleracea. *Cult.* Not introduced by Europeans, but by the Arabs.
Kochia arenaria. Very abundant.
Sueda Indica (*Salsola lana*, Edgew.). (*Lani*, Ind.)

Anabasis multiflora. (*Lana*, Ind.) Grows in the Bari Bār to 7 or 8 feet high, like a dwarf tree.
Caroxylon fœtidum. (*Gora lana*, Ind.)
Salsola Griffithsii. (*Khar*, Ind.) Used for preparing *Sajji*, potash.

AMARANTHACEÆ.

Celosia argentea.
Amaranthus Mangostanus. *Cult.*
—— Gangeticus. *Cult.*
—— angustifolius.
—— Blitum.
Mengea tenuifolia.
Euxolus caudatus.
Achyranthes aspera.
Digera arvensis.
Alternanthera denticulata.
Pupalia lappacea.
Ærua Javanica.
—— Bovii.—See description, p. 206.
—— brachiata.
—— scandens.

NYCTAGINEÆ.

Boerhaavia elegans. (*Helra*, Ind.) Much eaten in the desert. The seeds mucilaginous.
—— diffusa.
—— repens.
—— vulvariifolia.

POLYGONACEÆ.

Polygonum glabrum.
—— Dryandri.
Rumex dentatus (*Wallichianus*).
Calligonum polygonioides.

EUPHORBIACEÆ.

Phyllanthus Niruri.
Emblica officinalis. *Cult.*
Crozophora oblongifolia.
—— plicata.
Euphorbia Helioscopia.
—— Chamæsyce.
—— granulata, *Forsk.*
Ricinus communis. *Cult.*

URTICACEÆ.

Cannabis sativa. *Forskälea* probably exists in the rocks at Chandniot, but I did not see it.
Ficus Indica.
—— religiosa.
—— caricoides.

Morus Indica.
—— Tatarica. *Cult.*

SALICINEÆ.

Populus Euphratica.
Salix Babylonica. *Cult.*
—— tetrasperma. *Cult.*

GNETACEÆ.

Ephedra alata.

ENDOGENES.

ORCHIDEÆ.

Zeuxine sulcata.

PALMÆ.

Phœnix dactylifera. Introduced by the Arabs in the seventh century; now forming vast self-sown groves.

ASPHODELEÆ.

Asphodelus fistulosus.
Asparagus, sp. Rechnab and Chaj Bārs.
Allium Cepa. *Cult.*
Uropetalum probably exists, though I never met with it.

AMARYLLIDEÆ.

Narcissus poeticus. Gardens.
Crinum, sp. Gardens.

TYPHACEÆ.

Typha latifolia.

CYPERACEÆ.

Cyperus rotundus, *Linn.*
—— procerulus.
—— Irio.
—— pygmæus. *Stylo trifido,* as also in the Egyptian and Australian forms.
Scirpus grossus.
—— affinis (*Nees*).
Fimbristylis communis, *Knth.*
Eleocharis palustris.

GRAMINACEÆ.

ORYZEÆ.

Oryza sativa. *Cult.*

OLYREÆ.

Zea Mays. *Cult.*

PANICEÆ.

Paspalum scrobiculatum. *Cult.*, but not common.
Panicum brizoides.
—— colonum.
—— coccospermum (*vestitum,* Nees).
—— psilopodium.

Panicum antidotale.
—— miliare. *Cult.*
—— Hydaspicum. Desert.—See description, p. 207.
—— miliaceum. *Much cultivated.*
Digitaria ciliaris.
—— sanguinolenta.
Oplismenus prostratus (*Pan. setigerum*, Roxb.).
—— Crus-Galli (*Pan. hispidulum*, Roxb.).
Setaria Italica. *Cult.*
—— glauca.
—— verticillata.
Pennisetum Cenchri.
Cenchrus echinatus.
—— montanus, *Nees*. Varies with green or purple spikes.
Penicillaria spicata. *Cult.*
Lappago racemosa.

PHALARIDEÆ.

Phalaris minor.

ANDROPOGONEÆ.

Imperata cylindrica (*Kœnigii*).
Erianthus Ravennæ.
Saccharum Sara.
—— canaliculatum.
—— spontaneum.
—— officinarum. *Cult.*
Andropogon Bladhii.
—— annulatus.
—— pertusus.
—— (Cymbopogon) Arriani.—See description, p. 208.
Vetiveria muricata. Abundant in the north, but ceases about 80 miles north of Multan.
Sorghum vulgare. *Cult.*
—— Halepense. Rare.
Apluda communis, *Nees* (*aristata*, Roxb.).
Elionurus hirsutus.

STIPACEÆ.

Aristida (Chætaria) *a*. vulgaris.
—— —— *β*. var. cærulescens.
—— hystricula, n. sp.—See description, p. 208.
—— (Arthratherum) Royleana.
—— funiculata.
—— Mallica, n. sp.—See description, p. 209.
—— articulata, n. sp.—See description, p. 209.
—— (Stipagrostis) plumosa, *Linn.* nec *T. Anderson.*—See description, p. 209.
—— pogonoptilum, *Jaub. & Spach*, no. 129?; no. 638 of *Stocks's Herb.*
—— hirtigluma.

AGROSTIDEÆ.

Polypogon Monspeliensis.
Vilfa scabrifolia, *Hochst.* no. 2302; no. 667 of *Stocks.*
—— commutata.
—— pallida.

PAPPOPHOREÆ.

Pappophorum Arabicum?
—— nanum (*Vincentianum,* Schmidt).
—— Persicum? An *Aucheri?* but much taller.

CHLORIDEÆ.

Eleusine Corocana. *Cult.*
—— flagellifera (*Arabica*).
Dactyloctenium Ægyptiacum.
—— var.? mucronatum. No. 54689, *Aucher.*
Cynodon linearis.
Dinebra verticillata.
Chloris villosa. Shahkot.
Schœnfieldia pallida. Rare.

ARUNDINEÆ.

Arundo Donax.
Phragmites Roxburghii.

HORDEEÆ.

Hordeum 6-stachyum. *Cult.*
Triticum æstivum. *Cult.*
—— hybernum. *Cult.*
—— durum. *Cult.*
Lolium temulentum.

AVENEÆ.

Avena fatua.

POEÆ.

Æluropus repens (*Nilotica*).
Poa annua.
Eragrostis poæoides.
—— unioloides.
—— Brownii.
—— tremula.
—— plumosa.
—— interrupta, *Roxb.*
—— viscosa, *Roxb.*
—— nutans.
—— diandra, *Roxb.*
—— cynosuroides. "*Panni.*"

BAMBUSEÆ.

Bambusa. *Cultivated* at Baghdad, 40 miles above Multan.

Marsileaceæ.

Marsilea quadrifolia.

Equisetaceæ.

Equisetum.

Filices.

Adiantum Capillus-Veneris. In old wells.

Musci.

Phascum, sp.

	Cult.	Spont.	Cis Sutlej.	Sindh.	India.	Arabia & Africa.	Europe.
THALAMIFLORÆ.							
Ranunculaceæ	..	1	1	1	1	1	1
Menispermaceæ	1	2	1	2	1	1	..
Nymphæaceæ	..	1	1	1	1	1	..
Nelumbiaceæ	1	..	..	..	..	..	..
Papaveraceæ	1	3	2	3	1	2	2
Cruciferæ	6	11	4	9	4	9	3
Resedaceæ	..	1	1	1	1	1	..
Capparideæ	1	7	4	7	5	7	1
Polygalaceæ	..	1	..	1	..	1	..
Elatinaceæ	..	2	1	2	2	1	..
Caryophyllaceæ	..	6	5	6	6	5	5
Portulacaceæ	..	3	3	3	2	2	1
Mollugineæ	..	4	3	4	4	4	1
Frankeniaceæ	..	1	..	1	..	1	1
Tamariscineæ	..	3	2	3	1	2	1
Malvaceæ	2	9	6	9	8	8	3
Tiliaceæ	1	7	5	7	7	7	..
Meliaceæ	2	..	..	..	..	..	..
Sapindaceæ	..	1	1	1	1	..	..
Geraniaceæ	..	1	..	..	..	1	..
Oxalideæ	..	1	1	1	1	1	1
Zygophyllaceæ	..	4	2	4	3	4	2
Rutaceæ	..	1	1	1	..	1	1
Ampelideæ	1	1	1	1	1	1	..
Total..	16	71	45	68	50	61	23
CALYCIFLORÆ.							
Rhamnaceæ	2	2	2	2	2	1	1
Anacardiaceæ	1	..	..	..	..	..	..
Moringaceæ	1	..	..	..	..	..	..
Leguminosæ	23	34	28	32	25	23	10
Rosaceæ	7	2	1	2	1	2	1
Granateæ	1	..	..	..	..	..	..
Salicarieæ	1	4	4	4	4	1	..
Cucurbitaceæ	14	5	4	5	4	3	..
Aizooneæ	..	3	2	3	2	2	1
Umbelliferæ	2	..	..	..	..	..	..
Rubiaceæ	..	2	2	..	2	..	..
Synanthereæ	3	17	17	15	11	15	5
Total..	55	69	60	63	51	47	18

	Cult.	Spont.	Cis Sutlej.	Sindh.	India.	Arabia & Africa.	Europe.
COROLLIFLORÆ.							
Primulaceæ	..	1	..	1	1	..	1
Sapotaceæ	2	..	..	..	..	..	..
Apocyneæ	1	..	..	..	..	..	..
Asclepiadaceæ	..	8	4	8	4	4	..
Gentianaceæ	..	2	2	1	2	1	..
Bignoniaceæ	..	1	1	..	1	..	..
Convolvulaceæ	..	11	9	11	9	5	2
Cordiaceæ	2	..	..	..	..	..	..
Boragineæ	..	12	10	12	7	7	3
Solanaceæ	3	6	4	6	5	3	3
Sphenocleaceæ	..	1	1	1	1	1	..
Scrophularineæ	..	11	10	11	10	4	3
Orobancheæ	..	1	1	1	..	..	..
Labiatæ	4	3	2	3	3	2	..
Verbenaceæ	..	4	4	4	3	2	..
Acanthaceæ	..	4	3	4	3	3	..
Plumbagineæ	..	1	1	1	1	1	..
Salvadoraceæ	..	2	2	2	1	..	..
Plantagineæ	1	1	1	1	..	1	1
Total	13	69	55	67	51	34	13
MONOCHLAMYDEÆ.							
Phytolaccaceæ	..	3	2	3	2	3	..
Salsolaceæ	2	6	4	6	2	4	2
Amaranthaceæ	2	13	10	13	13	11	2
Nyctagineæ	..	4	2	4	3	4	..
Polygonaceæ	..	4	3	4	3	4	2
Euphorbiaceæ	2	6	4	6	4	6	2
Urticaceæ	1	5	5	5	5	2	1
Salicineæ	2	1	..	1	..	1	..
Gnetaceæ	..	1	1	1	1	1	..
Total	9	43	31	43	33	36	9
ENDOGENES.							
Commelinaceæ	..	1	1	1	1	..	..
Orchideæ	..	1	1	1	1	..	..
Palmæ	1	..	..	..	..	..	..
Asphodeleæ	1	2	2	2	1	1	1
Amaryllideæ	2	..	..	..	..	..	..
Typhaceæ	..	1	1	1	1	1	1
Cyperaceæ	..	8	7	8	8	5	2
Graminaceæ :—							
Olyreæ	1	..	..	..	..	..	..
Paniceæ	6	16	14	15	14	10	5
Phalarideæ	..	1	1	1	1	1	1
Andropogoneæ	2	13	11	13	11	7	2
Stipaceæ	..	9	7	5	3	5	..
Agrostideæ	..	4	3	4	3	2	1
Pappophoreæ	..	3	..	1	..	3	..
Chlorideæ	1	7	5	6	5	5	2
Arundineæ	..	2	2	2	2	1	1
Hordeeæ	4	1	1	1	..	1	..
Aveneæ	..	1	1	1	1	1	1
Poeæ	..	12	10	12	8	6	3
Bambuseæ	1	..	..	..	..	..	..
Oryzeæ	1	..	..	..	..	..	..
Total	20	82	67	74	60	49	20

	Orders.	Genera.	Cult.	Spont.	Cis-Sutluj.	Sindh.	India.	Arabia & Africa.	Europe.
Thalamifloræ	22	50	16	71	45	68	50	61	23
Calycifloræ	8	52	55	69	60	63	51	47	18
Corollifloræ............	16	52	13	69	55	67	51	34	13
Monochlamydeæ........	9	27	9	43	31	43	33	36	9
Exogens	55	181	93	252	191	241	185	178	63
Endogens	8	41	20	82	67	74	60	49	20
Phanerogams	63	222	113	334	258	315	245	227	83
Acrogens, exclusive of Fungi	4	4	..	4	4	4	4	4	4
Grand total..	67	226	113	338	262	319	249	231	87

Notes on some of the Plants in the foregoing list.

POLYGALA.

There seems to be very much confusion about these *Blepharidia.* Dr. T. Anderson, in his 'Florula Adenensis,' unites a vast number of the forms published in DC. Prod. and Wight and Arnott, Prod., under the name *triflora* of Linnæus. I have examined the original specimens in the Herrmann herbarium in the British Museum, no. 269, published by Linnæus in the 'Flora Zeylanica,' vol. ii. p. 10; I have carefully compared them with the numerous specimens in the Kew herbarium, and have satisfied myself that there are three or four distinct species. *Triflora* is *rosmarinifolia* exactly. The *triflora* of Wight and Arnott has not such pointed leaves and alæ; the capsules are not at all margined, and usually pubescent, not glabrous. Both of these forms, as well as the third, *serpyllifolia,* to which I would refer the Aden species, though it differs somewhat from the Indian form, are prostrate. The last form is that described by DC. under the name *erioptera,* which does not suit this particular form, as the alæ are almost glabrous—only delicately ciliolate; it may probably be the "*obtusata*" of DC. The pubescent form obtains principally to the West of Africa, while those from Egypt and Abyssinia are almost identical with the Multan type.

HIBISCUS LAGUNEOIDES. Bipedalis, ramosus, omnino pilis stellatis pubescens, foliis late ovatis plus minus trilobatis repandis, stipulis minutis subulatis, floribus axillaribus solitariis, pedicellis (ramulisque junioribus) glanduloso-pilosis; involucello 9-fido; calyce 5-fido ner-

voso nec inflato, hirtello, pubescentia biformi; corolla parvula, petalis oblique truncatis calyce vix longioribus albis demum rubentibus; staminibus monadelphis biseriatis; antheris innumeris; stigmatibus 5; capsula ovata pubescente, pilis stellatis setisque brevibus rigidis, 5-loculari, loculis 12-spermis, seminibus nigris glabriusculis.

Both in the tamarisk jungle and in cotton-fields.

MONSONIA MALLICA. Foliis cordatis sericeis obtusis, scapis hirsutis, bracteis barbatis, sepalis mucronatis.

Multan; Sindh.

Annua, radice fibrosa, caule subnullo, foliis paulatim approximatis cordatis obtusis utrinque sericeis, nec niveis nec hirsutis nec nervosis, stipulis cuneatis ciliatis; scapis prælongis vix erectis, pilis longis patentibus albis hirsutis; umbellis multifloris, bracteis subulatis apice pilis longis barbatis, pedicellis elongatis pubescentibus; sepalis obovatis sericeo-pubescentibus marginatis longe mucronatis; petalis istis æqualibus integris; staminibus 15 in phalangibus 5 monadelphis; stylis sericeis; achenio basi acuto apice truncato rugoso pubescente, rostro prælongo plumoso, 2½–3 poll. longo.

This differs from *M. nivea* in the pubescence and texture of the leaves and the mucro of the sepals, and from *M. hispida* in the size and pubescence. Cf. Boissier, i. 8. p. 122.

I have very great hesitation about the species of *Zizyphus* cultivated in India or found in the Punjab.

The *Z. vulgaris* is cultivated in Cashmir, and, rarely, in gardens in the Punjab: I have not observed it in Multan. *Z. Jujuba* is abundant wild in the northern part of the Punjab, but not in Multan, where *nummularia* is only found sparingly, compared to the profusion seen in the northern districts. Although in the usual form no one could hesitate about the species, I have seen small stunted specimens of *Jujuba* that it would be difficult to distinguish from *nummularia* with thorns shorter than usual.

Z. Spina-Christi is found in gardens, but sparingly, and with some difference from the typical and Syrian form. The bark, though paler than the common Punjab *Ber*, is not the clear grey so remarkable in all the Syrian and African specimens and descriptions; and the inflorescence is almost glabrous and with almost sessile cymes, not downy and dichotomous. The petals in all that I have examined are emarginate, whereas they are entire in *Jujuba*. The name *Nabeca* was given by Forskahl to this species, after the Arabic name *Nabc*; but, unfortunately, the name *Napeca* was applied by Linnæus to some specimens collected in Ceylon by Herrmann, now in the British Museum. I have compared the

original specimens with those under the same name in the Linnean herbarium, and I find them to be a form much resembling *Œnoplia*, but differing in having more glabrous leaves, longer peduncles to the cymes, and double thorns. I see specimens in the Kew herbarium almost exactly similar, from the Concan and Ceylon, from Mr. J. Walker; and it will be interesting if botanists on the spot, in Ceylon and the Concan, will ascertain if it be a different species or only a variety.

There now remains to me to define the form most abundant in the Punjab. I am not sure that it is anywhere truly wild, though I have observed it in the desert, but probably dropped by man or bird.

This species is immediately noticed on entering the western part of the Cis-Sutluj States, where it first appears as a small tree (the branches not drooping as the typical wild or cultivated *Jujuba*), and with almost smooth leaves. There is a slight pubescence in young specimens, but they are almost glabrous when old. The fruit is globular and dark-coloured, not orange or red like the wild Ber, or green like the cultivated. The leaves are usually roundish ovate, more or less serrulate. The inflorescence varies from perfect smoothness to thick tomentum. The cymes are usually short, sometimes reduced to a fascicle of flowers as in *Lotus*.

At first I had referred this to *Lotus*, but on comparison I find it is quite distinct; and there are no specimens in the herbaria leading from one form to the other; while it is difficult to consider this form to be only a variety of *Jujuba* as it has hitherto been defined.

Wight and Arnott define it by the tawny colour of the under surface of the leaf; but in the cultivated specimens, as well as in other northern wild specimens, the pubescence is almost grey, while we see a similar difference in the colour of the tomentum in *Œnoplia* and *nummularia*. Therefore I believe it is more correct to consider it a well-marked variety of *Z. Jujuba*.

ZIZYPHUS JUJUBA. Arbor, foliis ovatis serrulatis v. integris, spinis geminis, una longiore rectiuscula, altera uncinata, cymis brevibus, petalis unguiculatis concavis integris demum reflexis.

α. spontaneus. Foliis subtus ferrugineo-tomentosis, drupis sphæricis flavo-aurantiacis.

β. hortensis. Foliis late ovalibus 3-nerviis basi inæqualibus *integerrimis* nervis apice breviter mucronatis, sursum glabris, subtus cano-tomentosis, cymis subsessilibus; pedicellis pedunculo longioribus vix petiolum æquantibus, multifloris, alabastris depressis tomentosis sublanatis; drupis ovatis viridibus vel flavescentibus.

Hortis passim.

γ. *Hysudricus.* Foliis ovalibus obtusissimis basi paulo inæqualibus, junioribus pubescentibus demum utrinque glabratis serrulatis, cymis petiolo sublongioribus, pedicellis vel *glabris* vel lanatis integris ; drupa globosa viridi-purpurascente.

Punjab, passim.

Citrullus fistulosus, *Stocks in H. J. B.* vol. iii. p. 74. Hirsutus, foliis cordatis sinuato-lobatis v. pinnatifidis, flore hirsuto, stam. non nectariferis, pepone globoso hirsuto.

Sindh; Multan.

Hirsutissimus, caulis demum fistulosus. Folia cordata, sinuato-lobata pinnatifidaque laciniis obtusis rotundatis; juniora molliter, seniora scabre hirsuta, glandulosa, moschata, pallide virescentia. Cirrhi 2–4-fidi; bracteæ cucullatæ, glabriusculæ, 1–3-floræ. Flores pedunculati; ♂ pedunculis fœmineis triplo longioribus. Calyx complanatus, tubo subnullo, breviter 5-dentatus, dentibus subulatis. Corolla subrotata v. cyathiformis, extus hirsutissima, intus pallide flava glabra venosa 5–7-partita. Stamina 5, basi quasi articulata, nec fornicata nec ciliata, 2–3–4-adelpha, connectivo 3–4-lobato. Anthera sinuata; discus centralis depressus, subtrigonus. ♀ Calycis tubus contractus, brevissimus, limbo plano breviter 5-dentato. Corolla extus hirsutissime, intus glabre 5-partita (profundius quam in masculo), segmentis ovatis acutis. Stamina rudimentaria, 2–3, quorum 2 bidentata, glabra, nec basi nectarifera. Discus glandulosus, annularis, pulvinatus. Stylus brevis, crassus, 3-fidus, stigmatibus convoluto-infundibuliformibus. Ovarium 3-loculum, globosum, hirsutum. Pepo globosus, seminibus marginatis obtusis.

This species is found in Sindh and Multan, and much cultivated under the names of *Tinda*, *Albinda*, and *Dil-pasand*, "beloved to the heart": eaten cooked as a gourd. It seems a very different species from the water-melon, to which it is nearest. The stamina of the latter are nectariferous both in the male and female flower, as well as in *Colocynthis*; the anthers are only sinuate, not gyrose or conduplicate or anfractuose. M. Nandin refers this to *C. vulgaris*, but without any note as to whether he has made any experiments to prove the unity of the species.

Trianthema pentandra, *Linn.* Foliis oblique ovatis v. oblongis inæqualibus; floribus axillaribus, uno sessili cæteris brevi-pedunculatis 3–7-nis pentandris; fructu duro tetraspermo circumscisso, operculo clauso bipartibili loculo mitriformi.

North-west Provinces.

Annua, diffusa vel suberecta, ramis teretibus glandulosis. Folia opposita, inæqualia, oblique ovalia vel oblonga, subtus glauca, utrinque plus minus crystallino-papillosa, petiolis canaliculatis marginatis quasi amplexicaulibus glandulosis. Flores in axilla nidulans, unus sessilis, cæteri brevi-pedunculati terni vel septeni. Bracteæ bracteolæ scariosæ, acuminatæ. Calyx quinquepartitus, segmentis dorso carinatis cuspidatis margine membranaceis intus coloratis (rubris vel rarius albis) cum junioribus quinque alternis. Ovarium biloculare, 4-ovulatum, apice mitriformi bilobo (vel emarginato), lobis emarginatis. Styli 2, divaricati, longe stigmatosi. Fructus durus, circumscissus, operculo bipartibili dispermo clauso; cupula membranacea, disperma, placenta vera centrali sed alternatim ad parietes coalita. Semina subcompressa, rugosa, albumine pauco.

Common in cultivated ground as well as in the desert: it is called *Itsit*, and is used to procure abortion by the natives. It is generally reddish or purple, but has rarely a green fruit and stalk. It is very different from *T. pentandra β*, DC. Prod. iii. 852, which is the *obcordata* of Roxburgh.

Trianthema crystallina. Papillosa, foliis ellipticis (vel ovalibus v. spathulatis), floribus 5–6-andris monogynis, calyce pentagono nervoso, fructu dispermo operculo cupuliformi aperto.

Arabia. India, from the Peninsula to the Punjab.

Diffusa, ramosissima, crystallino-glandulosa, ramis stellatim prostratis teretibus. Folia subopposita, crassa, elliptica, ovalia v. spathulata, vel in Pentepotamia elliptica margine revoluto semiteretia, petiolis marginatis glanduloso-fimbriatis (in ramis omnibus persistentibus marcidis). Flores terni (in *W. & A.* et *DC.* congesti), axillares, bibracteolati. Calyx pentagonus, 5-fidus, segmentis late cuneatis 5–7-nerviis, marcescens, subhyalinus, apertus. Stamina 5, vel potius 6, raro 7. Stylus 1. Ovarium truncatum, supra cupuliforme. Fructus dispermus, placenta laterali, operculo aperto. Semina compressa, cochleata, rugosa, embryone albumen farinaceum paucum cingente.

This is found both in the Peninsula and Arabia with broader leaves than the Punjab form, and less crowded branches; but I cannot consider them even as varieties. It varies in having green or red branches. It is not common in cultivated places, but in the Rechnab desert there are miles of ground covered with it; it is eaten under the name of *Alethi* (as well as *Zygophyllum simplex* and *Tribulus alatus*). The women sweep up the seeds from the bare hard soil with little whisks, and they are then winnowed and sifted.

Trianthema Hydaspica. Papillosa, prostrata, foliis crassis ovatis, floribus in dichotomia sessilibus solitariis 5–7-andris digynis, fructu polyspermo biloculo.

Pentepotamia and Sindh.

Annua? Prostrata, omnino plus minus crystallino-punctata, ramis teretibus glanduloso-puberulis coloratis dichotomis. Folia opposita, crassiuscula, ovata, obtusa, margine revoluto, petiolo membranaceo-dilatato.

Flores solitarii, sessiles in dichotomia. Calyx 5-fidus, in sinibus segmentorum dentibus 5 (ut in *Ammannia*), acute pentagonus, segmentis ovatis extus herbaceis in mucronem glandulosum (uno excepto) productis, intus plus minus petaloideis roseis, demum in fructu stellatim patentibus. Stamina 7 (*fide Stocks* 5), filamentis filiformibus, antheris roseis. Styli duo, disjuncti, incrassati, stigmatosi. Ovarium biloculare, pluri-ovulatum, placenta centrali. Fructus pyxiformis, circumscissus, operculo clauso 2-loculari; capsula bilocularis, loculis membranaceis hinc parietis membranis sejunctis ita ut capsula pseudo-4-locularis fingitur. Semina numerosa, 8–10 in utroque loculo, cochleæformia, testa nigra rugosissima, embryone albumen paucum farinaceum cingente, cotyledonibus planis.

This appears to be peculiar to the basin of the Indus. Dr. Stocks referred it, in his letters and herbarium, to the *Diplochonium* of Fenzl. It seems to be quite different from the original species of that genus, *D. uvarioide* from the Cape being polyandrous and with smooth shining seeds. The fruit, habit, and calyx agree with this; but *Trianthema obcordata* has numerous stamens and seeds, and therefore must be referred to *Diplochonium*, if this be not rejoined to *Trianthema*.

Leptadenia Jacquemontii, though often leafless as described by Decaisne, as often has linear leaves exactly like those of *L. Spartium*; but the form of the corona and the pubescence of the corolla are different.

Pentatropis spiralis differs both in flower and foliage from *P. microphylla*, the Peninsular species. (See Pl. I. fig. 9.)

The leaves of the Punjab species are from ovate to almost linear with a gradual acumination, whereas those of *microphylla* vary from oval to ovate with a short abrupt mucro. The laciniæ of the corolla are erect, scarcely ever opening, and never reflexed, as are those of the latter, while the divisions of the outer row of the corona are blunt and rounded, not rather acutely calcarate as in *microphylla*.

Compare the dissections of *spiralis* by Decaisne (Ann. Sc. Nat. ii. 9, 11) with those of *microphylla* by Wight (Icones, ii. 352).

CEROPEGIA ESCULENTA. Volubilis, foliis carnosis ovatis linearibusve, umbellis multifloris, coronæ stamineæ lobis lateralibus obtusis.

Multan; Sindh.

Radix tuberosa, volubilis, glabra. Folia glabra, carnosa, ovato-oblonga vel linearia, 2–7 poll. longa, ½ ad 2 lata. Umbellæ compositæ, multifloræ. Calyx brevissimus. Corolla vix pollice longa, basi et fauce inflata, tubo longo, laciniis brevibus apice coalitis, pallide viridi-purpurascens, intus leviter barbatis. Corona lobis exterioribus obtusis, interioribus ligulatis multo longioribus. Folliculi divaricati, longe cylindrici, glabri.

The leaves (which are acid) and the tubers are eaten: called *Gahlot.*

This differs from *bulbosa* of Roxb. in the exterior lobes of the corona, which are blunt, and not acute as in *bulbosa,* which I have found at Banda. The flowers also are smaller, while the leaves are larger.

BOUCEROSIA EDULIS (Pl. I. fig. 1–8). Erecta, ramis subteretibus, foliis caducis, floribus pedicellatis geminis, corolla glabra laciniis subulatis.

Multan; Sindh.

Rhizoma stolonosum, crassum, ramis radicantibus, radicibus fibrosis. Rami erecti, succulenti, subteretes, 4-sulcati. Folia opposita, cuneata v. elliptica, caduca. Pedicelli gemini, alares, graciles, subpenduli, demum erecti, bibracteati, bracteis subulatis minutis. Calyx 5-partitus, segmentis acutis pellucido-marginatis. Corolla 5-fida, utrinque glabra, venacea, basi purpureo-striata, tubo inflato hemisphærico, laciniis subulatis attenuatis reflexis. Corona 15-fida, segmentis 5 ligulatis in antheris incumbentibus, 10 intermediis brevioribus falcato-subulatis intus cavis purpurascentibus nectariferis. Pollinia gibba, apice pellucida. Folliculi erecti, teretes, lævissimi, glaberrimi, valde attenuati. Semina marginata, alata, longe comosa.

Edulis, subacida, sponte in Salvadoretis crescit, ibi colligenda in foro venditur sub nomine *Situn.*

I refer our Desert species of *Heliotropium* to *bicolor*, Hochst. & Steud. (no. 62, DC. ix. 546), and *marifolium,* Retz. (no. 66, p. 547). I cannot agree in uniting these and several other species to *strigosum,* as Dr. T. Anderson proposes in his ‘Florula Adenensis’—at least I consider it premature; for though there are many points of resemblance, there are plenty of distinguishing marks. I have carefully examined all the specimens in the Kew and Linnean herbaria, and although there may be some which are too difficult to refer to the correct species without very minute and almost microscopic examination, I feel satisfied that it is safer to leave these forms as species till more thoroughly examined in living specimens.

The distinguishing marks may be taken, firstly, in the habit—*erect* (nos. 62, 63, 64, 67, 70, 72, DC.) or prostrate (65, 66, 71, &c.). The shape of the leaves—linear, linear-lanceolate, or elliptic or oval. The laciniæ of the calyx also give distinct marks: some are long, linear, and acute (62, 67, 72, 78; 7015, Wall.); others free, short, and blunt (63, 66, 70; 1389, 1392, Wight; 2092, Wall.). The nuts also give good marks: some are almost smooth (77, 78; 1389, Wight); some smooth below and strigose above (64); others (as 62, 63, 66, 72; and 1390 of Wight) thickly strigose; some are almost exactly globose, but others distinctly four-lobed. The anthers in many have hairs, converting the apex into a little pencil, while in other species they are wanting and are either simply apiculate or even blunt. The stigma in *linifolium* is smaller and *cordiform* obclavate, in all the rest parasol-shaped, with the apicula shorter or longer according to the species.

The throat of the corolla is usually closed with hairs, but in this, which I have referred to *bicolor*, it is open and bare. I have not had an opportunity of examining this point in an Arabian specimen.

Finally, we find every shade of pubescence, from the soft down of *tenuifolium* (no. 67) to the densely strigose forms of *strigosum*, *marifolium*, and *scabrum*.

LIMEUM INDICUM, *Stocks, MSS.* Prostratum, foliis suboppositis inæqualibus oblique ovatis vel rotundis mucronatis glabris, cymis brevi-pedunculatis, petalis hyalinis obcuneatis 3-dentatis, stam. 7, coccis lævibus depressis.

Sindh to Punjab.

Annua? Rami prostrati, velutini, ad nodos incrassati, ramulis alternatim brevioribus quaque axilla. Folia subopposita, oblique ovata v. rotundata, mucronata, integerrima, utrinque glabra, crassiuscula, petiolis brevibus subamplexicaulibus stipulam mentientibus. Cymæ brevissimæ, pedunculatæ, axillares vel supra-axillares, pedicellis bracteolatis, bractea scariosa acuta. Sepala 5, quincuncialia, ovata, acuta, herbacea, margine membranaceo albo. Petala 5, hyalina, unguiculata, obcuneata, apice truncata, tridentata, cum sepalis alterna. Stamina 7, filamentis basi dilatatis in discum glandulosum subcoalitis persistentibus, antheris 2-lobis introrsis. Ovarium 2-lobum, stylis 2, lobis contrariis, loculis 1-ovulatis. Fructus dicoccus, depresse subsphæricus, lævis, indehiscens. Seminis testa membranacea. Embryo annularis, albumen farinaceum amplectens, cotyledonibus longis linearibus.

The habit is that of *Glinus* or *Gisekia*. It differs from the generic character as given in DC. or Endlicher in having opposite leaves and smooth cocci.

ÆRUA BOVII, *Webb.* Ramosissima, dioica, lanuginosa, foliis sessilibus linearibus mucronatis, bracteis scariosis subglabris, stylo stigmatibus breviore.

Deserto Rechnab.

Dioica, erecta, ramosissima, lanugine stellata brevi vestita. Folia alterna, linearia, basi attenuata, apice mucronata. Spicæ axillares terminales-

que simplices vel ramosæ ita ut tota planta panicula vasta videtur. Flores terni, congesti, bracteis scariose argenteis obtusis subglabris. Calyx 5-partitus, laciniis extus longe lanatis, duabus exterioribus majoribus scariosis, tribus interioribus herbaceis linea viridi vel rubra notatis angustioribus.

♂ Stamina in annulum connexa, staminodiis obtusis 2-dentatis coloratis, filamentis calyce longioribus purpureis antherisque purpureis, polline luteo. Ovarium minutum, stylo nullo.

♀ Cupula staminifera 10-dentata, dentibus alternis (staminibus abortivis) acutis. Stylus ramis stigmatiferis 1½ brevior. Ovarium 1-loculum. Semen lucidum.

This species has been confused with *Javanica*, from which it differs in habit, leaves, and the minute character of the style and bracts. In *Javanica* the style is equal to the stigmatic branches, and the bracts are lanose, not glabrous. The true *Javanica* has short branches. *Javanica* has but few and rare male flowers (as remarked by Forskahl, p. 170), whereas *suaveolens* has as many male plants as female; and *Javanica* also is not sweet-scented. They both grow in the same neighbourhood, so that there is plenty of opportunity to compare them. I therefore consider *Æ. β. Bovii* is a distinct species rather than a variety as it has been considered by Webb in the Niger Flora, p. 173, and DC. Prod. xiii. p. 299.

PANICUM (Sect. xi. VIRGARIA, *Trin. ap. Steud. Gram.*) HYDASPICUM. Foliis planis sparse pilosis, gluma exteriore 3-nervia, superiore 7-nervia.

Rechnab Bār.

Culmi subcompressi, geniculati, nodique glabri. Vagina laxa, glabra, os versus ciliata, ligula minute ciliato-membranacea. Folia plana, sparse pilosa, margine minutissime serrulata, utrinque 3-nervia, sæpe purpurascentia. Paniculæ laxæ, ovatæ, pedunculo compressiusculo filiformi, ramis ramulisque capillaribus undulatis scabro-setosis. Locustæ ovoideæ, solitariæ, longe pedicellatæ. Gluma exterior flosculo plus duplo brevior late ovata, acuta, *trinervia*. Gluma superior 7-nervia, breviter mucronata. Flosculi inferioris palea inferne herbacea, semi-7-nervia, breviter mucronata; palea superne hyalina, elliptica, acutiuscula, integra.

☿ Floris superioris paleæ lævissimæ, muticæ. Lodiculæ majusculæ, ovario longiores, bilobæ, carnosæ. Ovarium læve. Styli 2, divergentes. Stigma purpureum. Stamina vix exserta. Antheræ fuscæ.

This differs from the cultivated *miliare*, Lam. (no. 483 in Steud. Gram. p. 73) in the glumes. The nerves in the lower are much stronger than any in this section that I have observed, and shorter. The upper are 7-, not 9–13-nerved. From *coloratum*, Linn. (no. 478. *ib.*) it differs in the absence of the raised glands from which the

hairs rise in the vagina. *Repens*, Lam., *arenarium* (no. 476. *ib.*), and *paludosum*, Roxb. (no. 465. *ib.*) have blunt glumes, and live in water.

ANDROPOGON (CYMBOPOGON) ARIANI. Cæspitosus, foliis brevibus complanatis, pedicellis pilis albis locusta longioribus, glumis inferioribus 5–9-nerviis ciliatis, superioribus 3-nerviis.

Deserta; Punjab.

Dense cæspitosus. Folia plana, brevia, glaucescentia. Vaginæ glabræ, ligula membranacea paleacea. Culmi glabri, erecti, 1–3-pedales. Paniculæ foliaceæ; pedunculi articulati, articulis breviter barbatis, vaginulis margine membranaceis, cito marcidis, subconjugatis. Spicæ cylindricæ, pedunculos æquantes. Locustæ geminæ, una sessilis (☿), altera pedicellata (♂). Glumæ utriusque bicarinatæ, ciliatæ, acutæ, subbifidæ, carinis serrulatis. Flosculi sessilis paleæ hyalinæ, ciliatæ, superior bifida aristata, arista locustam æquante. Lodiculæ grosse eroso-truncatæ, subbidentatæ. Flosculi ♂ pedicelli dense pilosi, pilis inæqualibus locustam æquantibus. Paleæ integræ, hyalinæ, serrulatæ, deciduæ. Antheræ luteæ. Stigmata aurantiaca.

There are several forms very much resembling one another, and which have been confused together in herbaria. This species differs from all in the plane, not convolute, leaves. *Circinatus*, Hochst. (Steud. Gr. no. 294, p. 387) differs from all in the indurated polished glume. *Oliverii*, Boiss. (no. 295. *ib.*; Desf., 288. *ib.*) has rough convolute leaves, longer than those of *laniger*. The pedicel and rachis have hairs equalling the floscules. The glumes are 5-nerved. *Laniger* (from Algiers) has much shorter convolute leaves, the pedicels not quite reaching to the floscules. The glumes 7–11-nerved.

There is another species, abundant in the lower Himalaya, differing in having longer, linear convolute leaves, spikes defracted, with much shorter hairs in the pedicels, and scarcely aromatic—almost the same as the Persian *Oliverii*.

ARISTIDA (CHÆTARIA) HYSTRICULA. Pusilla, glabra, gluma superiore acutata inferiorem ovulatam mucronulatam subduplo superante.

Sindh and Multan. (*Stocks*, No. 187 partim.)

Spithamæa, pallescens. Culmi graciles, glabri, striati. Vaginæ breves, ore pilis albis, longe ciliatæ. Folia glabra, convoluta, pollicaria. Paniculæ breves, paucifloræ. Gluma inferior ovata, acuta, carina serrulata in mucronem abeunte (2-linealis); superior sublævis, linearis, in mucronem hispidulum acutata (3–3½-linealis), quandoque fissa. Flosculus hispidulus, arista non articulata, stipite 8–10-lineali, setis subæqualibus 1–1½-pollicaribus hispido-scabris.

The habit is very unlike *Hystrix* (Linn. fil.; Steud. Gram. no. 99, p. 141), though the technical description is too much like.

Aristida (Arthratherum) Mallica. Foliis scabris *pilosis*, glumis subæqualibus (inferiore paullo *longiore*) acuminatissimis in *setula* hispidula terminatis.

Multan.

Nana, vix spithamæa, culmis parce pilosis. Folia scabra. Glumæ in setula hispidula terminatæ, acuminatissimæ, longior paullo brevior (5–7-linealis) carina serrulata. Gluma superior lævis, 1-nervia (4½–6-linealis). Flosculus scaberrimus; arista paullo *super* caryopsem secedens, stipite scabro-hispido 8–9-lineali, setis duabus 10–12 lin., tertia 14–15-linealibus.

This species is technically most like *Royleana*, Trin. (Steud. Gr. no. 177, p. 143), but the habit is very different; it is of a reddish colour, and very dwarf. It seems to approach nearest to *A. lieocalycina*, Trin. (Steud. Gr. no. 120, p. 146), but I have not seen an authentic specimen of that; the proportion of the glumes also is at variance.

Aristida articulata. Erecta, glabra, foliis subacerosis, panicula coarctata, glumis subæqualibus, arista ad apicem stipitis articulata.

Rechnab deserto.

Culmi erecti v. geniculatim decumbentes. Vaginæ nodique glabri. Ligula pilosa. Folia sesquipollicaria, subacerosa. Panicula coarctata. Glumæ hispidulo-scabræ; inferior paullo brevior, carinata, acuta, mucronulata; superior bifida, intra dentes setula mucronata. Flosculus striato-hispidus; arista in glumis latitans, ad apicem stipitis articulata, setis tribus subæqualibus 6–7-linealibus.

The habit is that of *rigescens* (R. S.; Steud. Gr. no. 100, p. 141); but I do not observe any other specimens of this species in the Kew herbarium, nor any in which the awn is jointed at the branching of the setæ.

Aristida (Stipagrostis) plumosa (*Linn.*; *Steud. Gr.* no. 125, p. 141) (*lanata* of Forskahl).

This species I have found both at Jhung and in the sand-hills to the south of the Multan district. I cannot agree with Dr. T. Anderson in referring the Aden species to this. One of the original specimens in the Linnean herbarium is identical with this. The other seems to be rather the "*obtusa*" of Delile (no. 128, Steud. Gr. p. 144). Col. Munro, in his paper on the Linnean grasses, makes no remark on this second specimen, which assuredly is a different species from the true and original *plumosa*.

In his Aden Flora Dr. T. Anderson unites *A. vulgaris*, Trin. (Steud. Gr. no. 66) to *A. Adscensionis*, Linn. (no. 76); but the blunt truncate glumes appear to me to be a most distinct characteristic.

Unfortunately I have lost or mislaid all my meteorological tables. I append an abstract of the only months I have found.

1850.	Minimum.			Maximum.			Mean.	Direction of Wind.	Rain.
	Extreme.		Mean.	Extreme.		Mean.			
									in.
April .	60°	73°	67°·7	87°	108°	95°	81°·8	$13\frac{1}{2}$ days N., $6\frac{1}{2}$ S.	0·27
May . .	66	88	76·7	95	118	108	93·35	$12\frac{6}{2}$ N., 2 S., $6\frac{6}{2}$ W., 2 N.E., 2 S.E., 2 S.W.	0
June .	76	89	83·6	99	117	111	97·66	6 N.–N.N.E., 24 S.–S.S.E.	0
July . .	70	87	79·4	88	113	106	92·8	$4\frac{1}{2}$ N., 5 N.E., $5\frac{1}{2}$ E., $9\frac{1}{2}$ S., 5 S.W., $1\frac{3}{2}$ W.	2·26
Aug. .	64	83	78·4	92	109	103	91·1	12 N., 4 N.E., 3 E., 2 S.E., 8 S., $9\frac{1}{2}$ S.W., 2 W.	0
Sept. .	69	78	72·9	97	108	99·6	86·2	$3\frac{2}{3}$ N., $3\frac{1}{2}$ N.E., $1\,\frac{1.5}{2}$ E., $\frac{1.5}{2}$ S., $4\frac{2}{2}$ S.W., 1 W.	0

DESCRIPTION OF THE PLATE.

Fig. 1. *Boucerosia edulis.* Corolla opened out.
2. Gynostegium and staminal crown, looking down.
3. Ditto, the staminal crown opened out.
4. Ditto, profile.
5. Part of corona opened out.
6. Ditto, magnified from the outside.
7. Ditto, ditto, from the inner side.
8. Ditto, one of the inner scales separated.
9. Coronal leaf of *Pentatropis spiralis*, copied from Decaisne, Flora Sinaica.
10. Coronal leaf of Multan form.
11. Coronal leaf of *P. microphylla*, according to Wight's Icones.

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OF THE

LINNEAN SOCIETY OF LONDON.

Letter from Mr. G. MANN, Government Botanist, describing his Expedition to the Cameroon Mountains. Communicated by Sir W. J. HOOKER, F.R.S., F.L.S., &c.

[Read June 5, 1862.]

SIR,—I have the honour to transmit to you a Report upon my expedition to the Cameroon Mountains, and at the same time to advise you that the collections which I made there are shipped to England in the same steamer that brings this letter.

I left Fernando Po on the 4th December, 1861, about 2 P.M., in a boat which I had anxiously awaited for a week. As soon as we had left the harbour and sailed round Point William, we were favoured by a strong sea-breeze, and reached Cape Horatio before sunset; whence we steered towards Ambas Bay, and, shortly before night set in, saw the Cameroons rising from the sea, and losing themselves in the clouds. Soon after 8 P.M. the islands in Ambas Bay came in sight, and after passing the first (Mondori Island), the sails were taken in, and the anchor let go. On the next day we reached the anchoring-place at 8 A.M., when I immediately landed. On landing I was received by my old host, and on reaching the house of the Rev. Mr. Saker, was informed he was at the Cameroons; but I received permission to keep the goods, which I had brought for barter, in the magazine of the mission. The place was as I found it a year before.

In the latter half of the day, I was much refreshed by the constant sea-breeze, which in Fernando Po we seldom enjoy, and which renders Victoria such a pleasant and agreeable residence for Europeans. How much more beneficial it would be for invalids if a sanitarium was established on one of the many hills which surround this settlement, when Europeans, and especially the English, who live in great numbers in the vicinity, could in five or six days exchange the dangerous climate of the Gulf of Guinea for their own, without the great expense with which such an exchange is at present connected.

The forest surrounding the settlement is the same that I saw last year,—beautiful in the beginning of December, when, from the change of season, many of the trees appeared in all the beauty of their young foliage, with large masses of flowers among various shades of green. Especially conspicuous was a species of *Baphia?*, the flower of which looked like a peony. *Lophira alata* was already in full flower: the lady natives wear in their hair and ears the light-red wings of the fruit of this plant. The shore is bordered by an *Amomum* (1034 of list), which is here very common along the coast; but I endeavoured in vain to find the white-flowered species which I noticed last year. *Monodora grandiflora* was conspicuous from its beautiful foliage; but my hope of obtaining fruits for the Museum was vain, for I had come too late, and they were already fallen. I found, however, living seeds, which I believe to be distinct from the specimen which I sent from St. Thomas's in fruit, and Prince's Island in flower. The fruits are the same.

I found the interpreter, who accompanied me last year in my excursion to one of the highest villages on the mountain, still in Victoria, and ready to accompany me on this expedition. When, however, he heard that I should be ready in one or two days to leave the coast, he made many difficulties; and the two following days were passed, with the aid of the missionaries, in tedious endeavours to organize my party of interpreters, guides, and porters.

On the 10th December, H.M.S. Bloodhound anchored near the settlement; and Consul Burton, accompanied by Commander Dolbin, landed. The former informed me that it was his desire to visit the mountains also; and we agreed that, ten days later, I should send down some of my people to Victoria, in order to fetch some more food, and at the same time to serve as guides to Consul Burton. On the night of the 12th–13th, the rainy season bade farewell to the coast; after a few days of fine weather, however, the rain poured down again, and brought to my recollection all the difficulties under which I had brought my first collection from the mountain of Fernando Po. At the same time I determined to commence my ascent on the next day, with or without the leave of the natives.

Both the chiefs of Bassumba, the first village up the mountain, having come to the market, I agreed to go with them to their homes, and thence to Mapanya. I also met with eight natives of Bassumba, who were willing to carry part of the things for four pieces of cloth (worth £4); and on the 13th I finally left the settlement, with one interpreter, six Kroomen, and eight natives.

Mr. Pinnock, of the mission, living in Victoria, accompanied me, and after a five hours' walk we reached the village of Bassumba (alt. 1492 ft.*).

The country through which we passed was of the same forest tract that surrounds Victoria; amongst the trees was principally conspicuous an *Eriodendron*, which attained an enormous circumference. Also *Anthocleista nobilis* and *Monodora grandiflora* were conspicuous from their beautiful foliage, and *Sterculia tragacantha*, without leaves, but covered with carmine-coloured fruit. *Ipomæa* and *Momordica* grew over the trees and bushes on every side where the wood was a little more open. Among the ferns was chiefly observable a beautiful *Hypolepis*.

Here and there the forest was broken by a plantation of plantains; and where the wood had been thinned, the surface was occupied by *Saccharum spontaneum*, *Panicum plicatum*, and *Amomum Danielli*, which over-ran the roads wherever sufficient air penetrated through the trees.

Crossing a small river, a small Aroid (*Anubias Barteri*, Sch.) attracted my attention by its beautiful snow-white flowers; it covered the stones in the stream, as well as the banks. *Anchomanes Hookeri* was seen on every side, yet manifestly smaller than in Fernando Po. *Elæis Guineensis* and *Raphia vinifera* are common; the latter grows to the height of 700 feet above the sea, and, as everywhere on the coast, forms the chief material in the construction of the huts.

When I wanted to leave Bassumba, on the morning of the 14th, to go to Mapanya, all the natives declared they were tired, and that they could not go until the following day; so that I was compelled to wait. I made an excursion during the day, and found, amongst other things, the large Aroid bulb which I send alive.

I gave the interpreter leave to go back to the settlement to see his sick mother, on condition that he came back in the evening;

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* This and the following altitudes are approximate only, calculated from boiling-point observations.

but he did not do this, and I should have been in great difficulty if Mr. Pinnock had not had a youth with him who was acquainted with the language, and whom he kindly allowed to remain with me.

After another altercation with the natives, who employed every stratagem to obstruct my ascent, we left the place on the 15th, and after a four hours' walk reached Mapanya (alt. 3146 ft.). The way led through the forest and cultivated fields of plantains, where an *Erythrina* thickly covered with flowers, but without leaves, looked like masses of flame in the distance, and beautifully adorned the landscape. Before reaching Mapanya I observed the last *Elæis*, which was not above 40 feet high, and had a very dwarfed growth. The natives here are accustomed to climb the palm-trees at break of day, and bring down the palm wine, leaving an empty gourd-flask for the next day. During this employment they make a loud laughing cry, which is repeated from the surrounding trees, and which I can compare to nothing better than to the crowing of cocks. The palm oil is only prepared for household use on the mountain, and the fresh nuts taken out of the spikes are carried to market.

I found the chief Botani an unusually polite man, and very different from the one I had previously seen. He had one of the huts cleaned for me at once, and asked about my requirements. I only wanted water, which he provided for a reward in tobacco. The natives here do not smoke, but snuff all the more; consequently I had provided myself with the latter article, which the people of both sexes 'accepted.' Even children of three or four years took a pinch, which plainly showed the custom to be an old one with them.

On the next morning at daybreak, the chief told me that the guide was ready to go with me up the mountain, whereupon I left the hut, and, to my no small astonishment, found eleven instead of one! I now gave the chief his arms, and made each of the people a present of some clothing and tobacco. I then gave four of my Kroomen orders to go back with Mr. Pinnock to Victoria, and await the arrival of Consul Burton, and return with him. I then left the place, with two of my people, accompanied by eleven natives. First we ascended a few bushy hills with a few trees, and on both sides of the way saw *Saccharum spontaneum*, 8–10 feet high. The *Amomum* had disappeared, and two species of *Impatiens* were common. When we had left behind the last plantation of plantains, we found ourselves in a forest in which I soon recognized the beginning of the fern region, and soon the valleys were seen filled with beautiful *Cyatheas*. The stems of the trees were clothed with *Trichomanes*; and *Dicksonia selinifolia* grew on nearly every stem of *Cyathea*. *Hypolepis pteridioides* appeared; and a small Orchid, not in flower, grew over the branches of the trees. The soil was covered with a thick clothing of *Selaginella Vogelii* as with a beautiful green carpet, and adorned with the beautiful flower-heads of a *Hæmanthus* 6 inches in diameter, and the less conspicuous but no less beautiful flowers of a species of *Calanthe*.

After an hour's walk through the forest, we reached the end of a lava-stream which flowed from the mountain in a S.S.W. direction. The extremity or basin (?) (alt. 4967 ft.), in which I sank to the loins, and which contained a great quantity of water, was clothed with a small *Nephrolepis*, and the moss, No. 1413. Here the *Ericinella* appeared first, in company with *Leucothoë angustifolia*, *Rubus apetalus*, and *Clematis Simensis*, on the border of the wood which fringed both sides of the stream. After we had climbed on the lava for an hour, the *Nephrolepis* disappeared, and the moss and lichens, Nos. 1411, 1412, took its place; these, we everywhere found, formed the first vegetation on the lava-field. Near these, two species of Orchidaceæ were observed, which continued for the next five hours, when they were succeeded by *Crassula Mannii*. After the lapse of this time, I saw before me three small hills, of which two were coloured black, and formed the crater from which the lava-stream had flowed. When we reached this, my guides asked me where I would sleep; to which I replied, where I could find water. (Altitude of base of these hills 7309 ft.)

Consequently we made only a short rest here, and passing the base of a row of hills, we reached, after twelve hours' walk, the beginning of a forest at the bottom of a grass-grown crater, and followed a footpath which seemed to be for the use of hunters. I here saw the small *Blæria spicata*, and the other beautiful plants *Hypoxis villosa*, var., and *Sopubia Madagascariensis*.

On approaching the borders of the wood, I saw *Hypericum angustifolium*, and the magnificent plant *Lasiosiphon glaucus*, in full flower. *Pittosporum Mannii* and *Paratropia Mannii* gave the forest a beautiful fresh green, while the other *Paratropia* (*P. elata*) had lost nearly all its leaves, and was just coming into flower.

On entering the forest, I found myself among a mass of flowers which highly delighted me; there was, indeed, scarcely a leaf to be seen. Two Acanthaceæ were loaded with flowers. There was also the leafless *Plectranthus insignis*; and I also saw, for the first time, the third species of *Impatiens* and the various Umbelliferæ of the collection. My portfolio was soon filled, and I left the collecting of most of the plants until another visit.

After penetrating a few hundred paces into the wood, we found a spring which afforded good water in abundance. This was a most fortunate circumstance, as it removed all the difficulties I had dreaded, and made me nearly independent of the natives. (Alt. 7880 ft.) After filling our vessel with water, I wandered about comfortable and happy; and when we had gone half-an-hour's walk further, we came to a small hut, in which some of the natives prepared their beds, while I pitched my tent close by, —the rest of the party going a little further to a hollow, as there was not room enough in the small hut for all. I was only disturbed once in the night by the howling of a hyæna close by my tent, and, after a sound sleep, was awakened in the morning by the laughing cry already mentioned, from the natives in the hollow.

As we proceeded, numerous mountains rose before us, and amongst them one distinguished by its height. Towards this I turned, with the intention of ascending it, but had not reached it when I perceived that nearly all the natives had left me; and the two who remained also refused to go any further. I desired them to await my return, and I went on, with both my Kroomen, to the mountain. When I reached its foot, I saw a still higher one, to which I then turned; but I was for some minutes enveloped in so dense a cloud that I could see nothing around me; moreover, not being able to go much further, since I had no food, and the natives had gone back, I returned to the mountain we had left. Its summit (alt. 9139 ft.) I now climbed, and hung up my self-registering thermometer, and following the natives, who indicated to me the road by the blowing of a cow-trumpet, as the clouds prevented my seeing more than ten paces ahead, I soon reached the top, and turned directly to the lava-field. On that being crossed, I observed, on the borders of the wood, *Cynoglossum micranthum* and the *Adiantum*, No. 1367, and later, on another field of lava, the *Cheilanthes*, No. 1372: *Trifolium Simense*, *Cyanotis Abyssinica*, and a species of *Habenaria* were all dried up. On returning, I found the descent of the lava-stream as difficult and fatiguing as the ascent, and reached Mapanya again at about six in the evening, without shoes, as both the pairs which I had taken with me were completely destroyed by the sharp lava.

On the following afternoon I heard that Europeans were approaching, and saw the principal men very busy in performing certain ceremonies to ward off bad luck. These consisted, first, in pouring water over a small broom on a stone in the middle of the village, and repeating this ceremony on all the roads that led out of the village. The strangers soon appeared, and I was delighted to see not only Consul Burton, but also Mr. Saker and Signor Calvo, the Judge of Fernando Po.

The two following days were consumed in altercations with the natives, and it was not until the morning of the 22nd that we were able to start for the spring previously mentioned, where we intended to leave a great part of our things concealed. Halfway across the lava-stream, Consul Burton pointed out to us a place where, with little labour, water might be found in case of need: this we distinguished as "Burton's well."

When we arrived at the foot of the first crater, finding it impossible to proceed further, we determined to encamp for the night. As we had suffered all day from the want of water, which prevented many of our people from travelling so quickly as ourselves, and we had no hope of their reaching the crater before night, I and some of our attendants went to fetch water; and on returning soon after sunset, found that half of the people had not yet reached the place.

After a cold night, which we passed wrapped in our clothes upon the ashes, at 4 A.M. we sent some of our people again for water; and on their return, all present were despatched to the spring with our baggage, and desired to prepare a sleeping-place. We ourselves waited till 2 P.M. for those who were still missing; but as they had not then arrived, we left the place, leaving behind one man with a supply of water for them. We reached the rendezvous in a quarter of an hour, and the rest of the people arrived at 5 P.M.

On the morning of the 24th we made an excursion to the mountain where I had left my thermometer, and found the reading to be, max. 71¼, min. 39¼. This mountain was named by Mr. Saker "Mount Helen." (Alt. 9450 ft.)

We had splendid weather; and a wonderful panoramic view spread around us—the principal mountain presenting two conspicuous summits, which we named "Mount Victoria" and "Mount Albert." After Consul Burton and Mr. Saker had made their geographical observations, we commenced the descent shortly before noon. During the day I felt very unwell; and as soon as we had returned to our camping-place, and I had put my plants in paper, I was obliged to go to bed. On Christmas Day I was worse, and quite unable to do anything. Mr. Saker left us on that day, promising to return in eight or ten days. On the 27th, Consul Burton and Signor Calvo left in search of a suitable place where water might be provided for an excursion to the summit. When they returned in the evening, I learned that Consul Burton had found time to ascend Mount Victoria; he had unfortunately, however, so injured his foot that he was prevented leaving our encampment for the next four weeks. Until the 30th I was equally unable to move; but on that day I took a stroll, which I repeated on the two following days.

On the 2nd of January, 1862, I felt so well that I set out with Signor Calvo on my first excursion to the summit. We reached Mount Helen shortly after noon, and, after a short rest, directed our steps towards the next high mountain, named by Consul Burton "Mount Isabel." This we reached about 2 P.M.; and while our people prepared a sleeping-place in the crater, we set off to the summit, whence we enjoyed a magnificent view over that part of the range which we had just passed, while in the opposite direction rose Mounts Victoria and Albert, with a number of small hills in front, the formation of which must be ascribed to an earlier period, as the lava-field which surrounded them was formed by eruption from Mount Victoria and Mount Albert. The highest peak of the smaller hills I took the liberty of naming Mount Hooker. On the field which we traversed this day, the few plants which might be termed arborescent were *Leucothoë angustifolia* and *Myrica salicifolia*, Hochst., which reached a height of 20 feet, but only grew scattered in hollows or craters. *Hypericum angustifolium* only occurred as a shrub, not above 6 or 8 feet high. *Cytisus Mannii* was in full splendour, quite covered with flowers, and formed very pretty little trees with round tops. *Helichrysum fœtidum* grew in every direction, and *H. Hochstetteri* peeped out of all the hollows, while *Wahlenbergiæ* rose everywhere above the surface of the grass. *Scabiosa succisa* was here only found on the west side of Mount Isabel. Another small plant, *Umbilicus pendulinus*, grew on the lava-fields. On the following day we left the crater (alt. 10,746 ft.) at 7 A.M., and went round the west side of Mount Hooker; and on the north side, at its base, we found a suitable place to pass the next night. After an hour's rest, we climbed to the summit of Mount Albert, which we accomplished in less than four hours. This western side of the mountain was quite naked, consisting only of ashes, in which one frequently sank two steps backwards for one forwards. When we reached the summit (alt. by Consul Burton's thermometer 13,553 ft.), we found the wind so strong that it nearly blew us down, and at the same time it was so cold (45½°) that it made our tropical hands almost useless. After half-an-hour's stay, we hung up the self-registering thermometer and left the top, too much benumbed by cold for any further observations. We reached the rendezvous about 3 P.M.; but my collection this day was not very rich. Besides the Gramineæ, I found *Helichrysum Mannii*, the above-named Crassulacea, *Swertia Clarenciana*, and *Veronica Mannii*, which all grew on the enormous lava-fields which surround the highest mountain.

I felt very weak and unwell, and soon found that I had a relapse of my previous illness. This induced us, on the following day, to set out on our return. When we reached Mount Isabel, we perceived, on the opposite side of the crater, a native, destitute of clothing, save a piece about the loins, accompanied by two dogs with wooden bells fastened to their necks. I made signs to him to approach us; but this he declined, and soon made off. With the exception of one, our Kroomen were so frightened at his appearance that they took to their heels.

We reached our encampment at 5.30 P.M., and on the following day were joined by Mr. Saker and Mr. Smith, also a missionary. My condition daily became worse, and it was impossible for me to collect. I lay nearly the whole day in my hammock, using every means at hand, but without success. While Consul Burton was prevented walking by his wounded foot, Messrs. Saker and Smith fell ill of fever; so that we were a pitiful company for mountain research.

On the 9th I concluded to turn back to Victoria, and on the following day was carried down by my men, as I was too weak to go on foot. Mr. Smith returned on the 15th, suffering much from fever; and on the following day, Mr. Saker, having been to the summit two days previously. On the morning of the 22nd we had a tornado; and when it had passed over, we observed snow on the north-east side of the mountain. Having re-established my health, I again left Victoria on the 24th, and reached the forest beyond Mapanya in the evening. Next day I climbed, for the third time, the lava-stream, and reached, early in the afternoon, Consul Burton's encampment, where I learned that on the previous day he had set out on an excursion. The following day he visited the hollows before mentioned; and on the 27th we climbed to the summit for the last time. After we had reached Mount

Isabel and had rested, Consul Burton climbed to the top and made his observations, while I completed a sketch and collected till 5 P.M. We slept in the crater of this mountain, and on the next day went to a small crater where Mr. Saker had previously had his resting-place. After enjoying ourselves a little, we went to the principal peak, and, when we had reached it, turned to the east in order to have a view in a north-east direction. On reaching the shoulder of the mountain, we again found ourselves upon an extended lava-field, with the crater of Mount Victoria straight before us. While I made a sketch of it, Consul Burton went towards it; and I followed a little more to the eastward, where I, for the first time, saw the north-east direction of the range, which looked like a plain. When I reached the crater, I found it was much larger than any I had before seen, being considerably larger than that of the peak of Fernando Po. The absence of our people prevented Consul Burton from making the observations he intended. I found on the eastern side much more of interest than on the west, as it was more or less covered with vegetation to the top. I found, amongst other things, the pretty erect *Lycopodium*, No. 1410, of the collection, the very pretty Composite *Senecio Burtoni*, H. f., and *Anthospermum asperuloides*. *Helichrysum Mannii* grew everywhere at the bottom of the mountain, and on this side extended to the top. The *Ericinella* and the *Cytisus* both reach to the middle of the mountain. Mount Albert is, without doubt, of more recent formation than Mount Victoria, or it would be clothed with more luxuriant vegetation than the latter, as the wind is nearly always N.E., and I have always observed the vegetation to be far poorer on the side exposed to it. On the next day I visited this side again, and added some mosses to my collection, while Consul Burton visited the Prince's and Albert craters, and employed himself in measuring the distances. After I had again ascended Mount Victoria, and had made drawings of the two craters mentioned above, and of Mount Albert, I set off to the latter to fetch the thermometer; but to my sorrow I found it in a very different place to that in which I had left it, hanging only on one hook, and with the bulb uppermost, the spirit having changed from a red to a pale yellow colour. By this misfortune I lost the result of a month, and must be content with daily observation. After having rearranged it, and taken a good view of the unvisited mountain-chain to the north-east, I set off towards the crater, where I met Consul Burton, who had sent his servant to erect the British flag on Mount

Victoria. We then emptied a bottle of champagne in honour of the day, and again separated, I to descend to our resting-place, and Consul Burton to climb Mount Albert. When he returned, I learned that he had found crevices from which smoke was issuing. On the next day I again climbed Mount Victoria (alt. by Consul Burton's thermometer 13,270 ft.), and then went to Mount Albert and fetched the thermometer. I found the max. temp. 55°, the min. 27°, and the temperature, at the time of my return, 35°. I then visited the chinks to ascertain the temperature in them, which I found to be *lower* than outside: no smoke was issuing from them. From this I set out to Mount Hooker, at the base of which I boiled the thermometer (alt. 10,856 ft.), and then ascended and repeated the operation at the top (alt. 12,271 ft.), and returned.

While the north-east side of the latter mountain is covered with the very pretty grass *Deschampsia cæspitosa*, which forms masses of 2–3 feet diameter and 2 feet high, I found the south-west side entirely clothed with *Hypericum*, *Ericinella*, *Cytisus*, and *Helichrysum chrysocoma*.

On the way to Mount Isabel I was enveloped in such thick clouds that I could only see one or two steps in advance, which made the road, which in fine weather is difficult, very disagreeable, as one could not see the many holes until upon the margin of them. When I had reached Mount Isabel the weather cleared, and I set off to the principal encampment, where Consul Burton informed me that there had been a heavy shower of hail during the day; heavy rain had also fallen at the camp, and wetted most of the things we had left.

At noon on the 31st of January, Consul Burton and his people left for Victoria. The weather considerably improved; and a hurricane, which blew down some old trees near the camp, was the only noteworthy incident of the day.

On the following day I was busily engaged in collecting the pretty *Brucea antidysenterica*, sheltered in a hollow from the strong wind, when I suddenly observed a native close by, who, without seeing me, had unwittingly dropped upon me. When I addressed him, he stretched out his head, and after a few minutes pronounced the word "tobacco." I called to him to come nearer, which he was unwilling to do; and when I went towards him, I saw that he trembled with fright. He was a head taller than I, and nearly twice as stout, without any clothes except a small piece of thin cloth about his loins; he had a cutlass and other arms. I made him understand that he should bring me a hyæna and a gazelle, which he promised, and slowly went away, looking back as though afraid that I should lay hands upon him.

On the 2nd of February I left the camp early in the morning, went towards Mount Helen, made a sketch of Mount Isabel, and turned towards the eastern peak, Mount Eliza, which lies on the border of the ascending lava-field and the wood which reaches to the sea. In fact, half of it is in the wood and half above it, while the southern part and the crater are covered with a thick growth of trees. From the top I had before me the most beautiful panorama which I had hitherto seen, beginning with Mount Victoria, and ending with the "Black Crater." I traced it on paper, noted the direction of the various mountains, and then set out on my return to the encampment, following a footpath which from the north-east side of the mountain runs north-west from Mount Eliza, west-south-west from Mount Helen, through Calvo's Crater to the west side of the mountain. From the depth to which the path is worn, it would seem that it must serve as a communication between the inhabitants of the west and those of the north-east side of the mountain, as the hunters who would visit the mountain by this path are very few.

When I approached the rendezvous in the evening, I saw the north side of the mountain on fire, which the high wind favoured and quickly spread over the mountain.

On the 13th I left the place, with my people, and reached the forest a little above Mapanya late in the evening (Ridge Camp, alt. 4284 ft.). I spent four days at this place, of which two, from the very heavy rain, were almost lost. On the 14th the thunder began at 5 A.M., and lasted till 4 P.M.; and in the middle of the day it was so dark that the screech-owls and large bats left their hiding-places, and announced their presence by their unpleasant cries. I, however, succeeded in collecting all the plants I wished, and among them a beautiful *Mussænda* and two species of *Oncoba.* On the afternoon of the 17th, when upon an excursion downwards, I met Mr. Smith and Mr. Pinnock, who had been good enough to come in case Botani should have any unfriendly intentions; they had, however, found him very well satisfied, and we passed Mapanya, the next day, without meeting with any disturbance, and reached Victoria in the afternoon.

After packing my plants, I left Victoria on the 24th, in company with Mr. and Mrs. Saker and Mr. Smith, in a boat of the mission, and reached the Cameroon river at 3 A.M. on the following morning, intending to return to Fernando Po by the next steamer.

I owe many thanks to Mr. and Mrs. Saker and Mr. Smith, who here, and especially in Victoria, have always assisted me with the greatest kindness and politeness, thus removing many of the disagreeables connected with the expedition.

In the trust that the result of this expedition may meet your approval, and that the flora of the mountains of west tropical Africa may thereby become known to science,

I have the honour to remain, &c., &c., &c.,
G. MANN.

Cameroons, February 27, 1862.

An Enumeration of the Species of *Acanthaceæ* from the Continent of Africa and the adjacent Islands. By THOMAS ANDERSON, M.D., F.L.S., Officiating Superintendent of the Royal Botanic Gardens, Calcutta.

[Read June 5, 1862.]

IN this enumeration, I have followed the classification I proposed in my monograph of the Cingalese species of Acanthaceæ, published in Thwaites's 'Enumeratio Plantarum Zeylaniæ.' The principal feature of that arrangement is the subdivision of the Order into two great Suborders, *Ruellideæ* and *Acanthideæ*, distinguished from each other by the character of the æstivation of the corolline lobes, and into a third small but well-marked group, separated from the other two by the nature of the calyx, and also by the peculiar placental processes of the seeds. I shall reserve some remarks on the limits of the genera and the geographical distribution of the African species for the general revision of the Order, which I hope to submit to the Society at an early date.

CONSPECTUS GENERUM.

Subordo I. THUNBERGIDEÆ.

Calyx ad annulum carnosum, integrum vel pluridentatum reductus. Corollæ lobi æstivatione contorti. Semina cupula suffulta.—Plantæ volubiles, raro prostratæ.

1. THUNBERGIA. *Calyx* inconspicuus, bracteis duabus magnis occultus.

Subordo II. RUELLIDEÆ.

Calyx herbaceus, 5-, *raro* 4-*partitus. Corollæ lobi æstivatione contorti. Semina retinaculo uncinato (vel papilla) suffulta.—Plantæ non volubiles.*

Tribus I. NELSONIÆ.

Calyx parvus, herbaceus. Semina minuta, globosa, papilla parva suffulta.—Herbæ neglectæ.

† *Corolla infundibuliformis.*

2. ELYTRARIA. *Stamina* antherifera 2; sterilia 2.—*Herbæ* acaules. *Scapi* folia squamæformia, adpressa.
3. NELSONIA. *Stamina* 2, sterilia nulla.—*Herbæ* caulescentes.

†† *Corolla* 2-*labiata.*

4. ADENOSMA. *Stamina* 2, in specie Africana.

Tribus II. RUELLIEÆ.

Calyx parvus, herbaceus. Semina conspicua, compressa, retinaculo uncinato suffulta.

Subtribus I. HYGROPHILEÆ.

Corolla 2-*labiata. Capsula polysperma, valvis striatis vel sulcatis.*

† *Capsula linearis, compressa, a basi ad apicem seminifera.—Flores laxe paniculati.*

5. BRILLANTAISIA. *Stamina* fertilia 2.
6. NOMAPHILA. *Stamina* fertilia 4.

†† *Capsula teretiuscula vel oblonga, a basi ad apicem seminifera.—Flores verticillati.*

7. HYGROPHILA. *Antheræ* muticæ, ovatæ.

Subtribus II. EURUELLIEÆ.

Calyx herbaceus. Corolla infundibuliformis. Capsula basi sterilis, supra medium seminifera.

† *Bracteæ minutæ vel nullæ. Capsula subteres.*

8. CALOPHANES. *Corolla* recta. *Antheræ* basi 2-calcaratæ. *Capsula* linearis, acuta, apice 4-sperma.

9. Ruellia. *Corolla* recta vel curvata. *Antheræ* muticæ. *Capsula* apice tumida, subglobosa, polysperma.

†† *Bracteæ 2, magnæ, corollam tegentes. Capsula obovata, basi breviter constricta, a dorso compressa.*

10. Petalidium. *Bracteæ* membranaceæ. *Calyx* 5-partitus. *Corolla* in æstivatione bracteis 2 magnis occulta. *Flores* solitarii.

11. Pseudobarleria. *Bracteæ* subherbaceæ. *Calyx* 4-partitus. *Flores* in cymulis lateralibus.

††† *Bractea 1 magna ; bracteolæ 2, breviores.*

12. Phaylopsis. *Calyx* inæqualiter 5-partitus. *Flores* dense spicati.

Tribus III. TRICHANTHERÆ.

Calyx amplus, coloratus vel membranaceus.

13. Whitfieldia. *Bracteæ, bracteolæ* et *calyx* colorata. *Corolla* infundibuliformis. *Ovarium* 4-ovulatum. *Semina* 4, magna, subdiscoidea ; retinaculis apice bidentatis.

Subordo III. ACANTHIDEÆ.

Calyx herbaceus, 5-, *raro 4-partitus. Corollæ lobi æstivatione imbricati vel imbricato-bilabiati. Semina retinaculo uncinato suffulta.*

Tribus I. BARLERIEÆ.

Corolla hypocraterimorpha vel infundibuliformis ; lobis in æstivatione imbricatis (in Lepidagathide *bilabiatis*).

Sect. 1. *Corollæ lobi æstivatione imbricati.*

† *Antheræ biloculares.*

14. Barleria. *Calyx* 4-partitus. *Corolla* regulariter infundibuliformis vel hypocraterimorpha. *Stamina* 2 vel 4 antherifera, cum 1 seu 3 sterilibus brevioribus.

15. Crabbea. *Calyx* 5-partitus. *Corolla* campanulata. *Stamina* 4. *Ovula* 4–8.

16. Lankesteria. *Calyx* 5-partitus. *Corolla* oblique hypocraterimorpha. *Ovula* 4.

†† *Antheræ uniloculares.*

17. Crossandra. *Calyx* 5-partitus. *Corolla* hypocraterimorpha.

Sect. 2. *Corollæ lobi æstivatione bilabiati.*

18. **Lepidagathis.** *Calyx* 5-partitus. *Stamina* 4; antheris bilocularibus.

Tribus II. Acantheæ.

Corolla unilabiata; lobis 3 vel 5, medio exteriore. Stamina 4; antheris unilocularibus.

† *Calyx cruciatim 4-partitus.*

19. **Blepharis.** *Corolla* tubo brevissimo. *Calyx* lacinia superiore integra 3-nervia, inferiore 2-nervia. *Capsula* valvis membranaceis.

20. **Acanthopsis.** *Corolla* tubo elongato. *Calyx* lacinia superiore obsolete 6-nervia, inferiore 6-nervia.

21. **Acanthus.** *Corolla* tubo brevissimo. *Calyx* lacinia superiore 4–plurinervia. *Capsula* valvis chartaceis.

†† *Calyx 5-partitus.*

22. **Sclerochiton.** *Calyx* scariosus, evenius. *Corolla* limbo 5-lobato.

Tribus III. Justicieæ.

Corolla bilabiata. Stamina fertilia 2, loculis plus minus superpositis.

Subtribus I. Eujusticieæ.

Corolla tubo non elongato, recto; labio inferiore trifido, lobo medio lateralibus majore; labio superiore brevissime bidentato. Stamina 2.

Sect. 1. *Calyx 5-fidus.*

† *Capsula dehiscens, simpliciter bivalvis.*

23. **Duvernoia.** *Corolla* labio superiore concavo, compresso, margine et apice incurvo, galeato; inferiore plano. *Stamina* exserta; antheris bilocularibus, muticis.

24. **Justicia.** *Corolla* labio superiore concavo, non galeato; inferiore convexo, rugoso. *Stamina* antheris bilocularibus, loculo inferiore calcarato.

25. **Schwabea.** *Corolla* labio superiore concavo; inferiore plano, basi gibbulis 2 notato. *Semina* abortu 2, orbiculata, barbata.

26. **Monothecium.** *Corolla* labio inferiore breviter trilobo, plano. *Stamina* antheris unilocularibus.

27. **Ecteinanthus.** *Corolla* labio superiore angusto, bidentato; inferiore convexo reticulato. *Stamina* antheris bilocularibus muticis; loculis subtransversim apice inserta.

†† *Capsula parietibus membranaceis, dehiscentia ruptis; placentis a valvis secedentibus.*

28. **Rungia.** *Corolla* labio inferiore biplicato. *Spica* quadrifariam dense bracteata.

Sect. 2. *Calyx 4-fidus.*

29. **Anisostachya.** *Calyx* bilabiatus; labiis bipartitis. *Corolla* labio superiore plano; inferiore convexo, medio venoso.

Subtribus II. DICLIPTEREÆ.

Corolla tubo elongato, recto vel resupinato; labio inferiore lobo medio maximo, lateralibus linearibus. Bracteæ, excl. Rhinacantho, *calyce multo majores.*

† *Corolla tubo resupinato.*

30. **Dicliptera.** *Capsula* abbreviata; placentis cum retinaculis in dehiscentia solubilibus.

31. **Peristrophe.** *Capsula* elongata; placentis valvis persistentibus.

†† *Corolla tubo recto.*

32. **Hypoestes.** *Bracteæ* tetraphyllæ. *Calyx* laciniis coalitis. *Stamina* antheris bilocularibus. *Flores* in capitulis 3- vel unifloris.

33. **Ramusia.** *Stamina* inclusa; antheris unilocularibus. *Flores* non spicati.

34. **Brachystephanus.** *Stamina* exserta; antheris unilocularibus. *Flores* spicati.

35. **Rhinacanthus.** *Calyx* 5-partitus. *Corolla* longe tubulosa; limbo bilabiato. *Stamina* antheris bilocularibus. *Flores* paniculati; bracteis parvis, subulatis.

Subtribus III. GRAPTOPHYLLEÆ.

Corolla tubo abbreviato, dilatato; labio inferiore lobis subæqualibus. Stamina 2 vel 4. Bracteæ parvæ vel nullæ.

† *Stamina* 2.

36. **Graptophyllum.** *Stamina* antheris bilocularibus. *Stylus* inclusus. *Bracteæ* minutæ. *Folia* variegata.

†† *Stamina* 4, 2 *ananthera.*

37. HAPLANTHERA. *Antheræ* uniloculares, basi mucronatæ. *Stylus* longus, exsertus. *Flores* axillares, solitarii. *Bracteæ* minutæ.

38. RUTTYA. *Antheræ* uniloculares, basi muticæ. *Flores* spicati.

Tribus IV. ASYSTASIEÆ.

Corolla infundibuliformis vel raro hypocraterimorpha, æstivatione bilabiata. Stamina 4, sæpe 2 sterilia vel ananthera.

Subtribus I. ERANTHEMEÆ.

Corolla hypocraterimorpha; lobis subæqualibus.

39. ERANTHEMUM. *Stamina* 2, cum rudimentis 2 sterilium; antheris bilocularibus, loculis plus minus divaricatis muticis.

Subtribus II. EUASYSTASIEÆ.

Corolla infundibuliformis; lobis æqualibus.

40. DICENTRANTHERA. *Stamina* 4, didynama, omnia fertilia; antheris loculis basi bicalcaratis.

41. ASYSTASIA. *Stamina* 4, omnia fertilia; antheris loculis basi mucronatis.

42. MACKAYA. *Stamina* 4, 2 ananthera; antheris loculis muticis.

I. THUNBERGIA, *Linn. fil.*

Sect. 1. *Calycis limbus truncatus.*

1. T. NATALENSIS, *Hook. Bot. Mag.* t. 5082.

Hab. Prope Maritzburg in Natal provincia Africæ austro-occidentalis, *Sanderson! in herb. Hook. et herb. Harvey.*

2. T. CHRYSOPS, *Hook. Bot. Mag.* t. 4119; *N. ab E. in DC. Prod.* xi. p. 55.

Hab. Ad Sierra Leone, *Whitfield! in herb. Hook.*

3. T. GERANIIFOLIA, *Benth. in Fl. Nigrit.* p. 475.

Hab. Ad Sierra Leone, *Vogel! in herb. Hook.*; *Wilford in herb. nostr.*

4. T. VOGELIANA, *Benth. l. c.* p. 476.

Hab. In insula Fernando Po, *Vogel! in herb. Hook.*

5. T. ERECTA, *T. Anders.*—Meyenia erecta, *Benth. l. c.* p. 476.

Hab. Ad Cape Coast in Africa occidentali tropica, *Vogel! in herb. Hook.*

Sect. 2, *Calycis limbus pluridentatus.*

6. T. CYNANCHIFOLIA, *Benth. l. c.* p. 475.

Hab. Ad ripas fluvii "Quorra," *Vogel! in herb. Hook.*

7. T. KIRKIANA, *T. Anders.* Scandens, strigoso-hirsuta; foliis lanceolatis, acutis, basi acute hastatis, integris, trinerviis, utrinque scabro-hirsutis; pedicellis axillaribus, unifloris; bracteis ovato-lanceolatis, longe acuminatis, plurinerviis; calyce 6–7-fido.

Hab. Prope "Satohi" in Africa orientali tropica, ad altitudinem 3000 ped., *Kirk* !

Suffrutex 1–2-pedalis. *Caules* lignosi, subteretes. *Rami* herbacei, angulati, volubiles. *Folia* 1–2 unc. longa, basi ½–1 unc. lata, valde et acute hastata, pilis strigosis hirsuta. *Pedicelli* plerumque folia superantes, erecti. *Bracteæ* fere 1 unc. longæ, herbaceæ, 5–6 nerviæ, extus strigoso-hirsutæ, intus glabræ. *Corollæ* tubus 1 unc. longus, incurvus; limbus amplus, profunde 5-fidus, lobis subæqualibus, rotundato-ovatis. *Corolla* pallide lutea, fauce purpurea.

This species resembles some of the hastate-leaved forms of *T. fragrans*, Roxb., but it is easily distinguished from them by its long-pointed bracts and 3-nerved leaves.

8. T. ALATA, *Bojer, in Hook. Exot. Fl.* t. 17; *N. ab E. in DC. l. c.* p. 58.

Hab. In oris Africæ orientalis ad lat. 5°–6° austr., *Forbes*! *in herb. Hook.*; in pratis humidis insularum Zanzibar et Tombæ in ora orientali Africæ, *Bojer* ! *in herb. Hook.*

9. T. ANGULATA, *Hils. et Bojer in Hook. Exot. Fl.* t. 166 et 177. f. 3, 4, 5.

Hab. In Africa australi, *Drège*! *in herb. Hook. et Sonder*; in insula Madagascar, *Bojer*! *in herb. Hook.*

Distr. In India orientali, sed certe non spontanea.

10. T. LANCIFOLIA, *T. Anders.* Caule erecto, subtereti, bisulcato, striato; foliis sessilibus, lanceolatis, acuminatis, mucronulatis; pedicellis axillaribus, solitariis, unifloris; bracteis ovato-lanceolatis, acutis, reticulato-venosis; calyce carnoso, incrassato, limbo paucidentato, dentibus inæqualibus breviter subulatis; corolla recta, tubo abbreviato, fauce amplo, limbi lobis æqualibus; staminibus 4, didynamis, antheris bilocularibus, 2 basi et apice aristatis, 2 apice solum aristatis; stigmate infundibuliformi, trigono. Capsulam non vidi.

Hab. In arvis ad altitudinem 2500 ped., prope Tshinsunze in Africa orientali tropica, *J. Kirk*!

Herbacea, erecta vel subvolubilis. *Rami* striati. *Folia* sessilia, acuminata, 1–3 unc. longa, ¼–½ unc. lata. *Pedicelli* proanthesin plus minus deflexi, apice paulo incrassati, ½–1 unc. longi. *Bracteæ* coriaceæ. *Corolla* recta, ampla, 1¼ unc. longa, flava, fauce purpurea.

11. T. **Drègeana**, *N. ab E. DC., l. c.* p. 58.
Hab. Ad Uitenhage in promont. Bonæ Spei, *Drège* ! *in herb. Hook., Sonder, et Harvey.*

12. T. **atriplicifolia**, *E. Meyer, in herb. Drège.*—T. Drègeana, *N. ab E. in herb. Hook.* partim.—T. aspera, *N. ab E., DC., l. c.* p. 56.
Hab. In promont. B. Spei, *Drège* ! *in herb. cit.*; Port Natal, *Krauss in herb. Hook.*

13. T. **neglecta**, *Sond. in Linnæa*, xxiii. p. 89.—T. hirta, *Sond. l. c.* p. 88.—T. Drègeana, *N. ab E. in herb. Hook.* partim.
Hab. In promont. B. Spei, *Drège* !, *herb. Ecklon et Zeyher* !

14. T. **Capensis**, *Thunb. Prod. Fl. Cap.* p. 106.
Hab. In Africa australi, *Drège* ! *Sanderson* ! *in herb. Hook.*; *in herb. Ecklon et Zeyher* !

15. T. **reticulata**, *Hochst. in Schimp. Pl. Abyss.* n. 758; *DC. l. c.* p. 58.
Hab. In Abyssinia, *Schimper* !

16. T. **annua**, *Hochst. in Kotsch. Pl. Nub.* n. 109; *DC. l. c.* p. 55.
Hab. In Nubia et Abyssinia, *Kotschy* !

17. T. **hirsuta**, *T. Anders.* Subprostrata, hirsuta; foliis subsessilibus, triangularibus vel ovato-lanceolatis, basi rotundatis vel subcordatis, 5-nerviis, margine sinuato-dentatis; pedicellis erectis, axillaribus, elongatis, unifloris; bracteis reticulatis, ovato-lanceolatis, acutis, basi cordatis; calyce 12-fido; corollæ tubo basi constricto, superne ventricoso, multum incurvo.
Hab. In Abyssinia, *Plowden* ! *in herb. Hook.*
Caules subprostrati, subteretes, pilis patentibus hirsuti. *Folia* 1–1¼ unc. longa, 1 unc. lata, herbacea, hirsuta. *Pedicelli* 3 unc. longi, axillares, uniflori, hirsuti. *Bracteæ* 1¾ unc. longæ, ¾ unc. latæ, reticulato-nerviæ, extus submolliter tomentosæ, intus glabræ. *Corollæ* tubus 1½ unc. longus, basi constrictus, ad medium ventricosus, ad faucem paulo constrictus; limbus subcoriaceus, lobis parvis, subæqualibus. *Capsula* glabra.

II. Elytraria, *Vahl.*

1. E. **crenata**, *Vahl. En.* i. p. 106.—E. marginata, *Pal. de Beauv. in Vahl. En.* i. p. 108.—E. virgata, *N. ab. E., DC. Prod.* xi. p. 63.
Hab. In insula Fernando Po, *Vogel* ! *Mann* ! *in herb. Hook.*; insula St. Thomas, *Don* !; Tette et Senna prope flumen Zambese, *Kirk* !
Distr. In regionibus calidioribus Americæ borealis, atque in Asia tropica.

III. Nelsonia, *R. Br.*

1. N. **tomentosa**, *Willd. Sp. Pl.* ed. 2, p. 419.—N. rotundifolia, *R. Br. Prod. Fl. Nov. Holl.* i. p. 481.—N. nummulariæfolia, *Roem. et Sch.*

Syst. i. p. 173.—N. Pohlii, *N. ab E. in Endl. et Mart. Fl. Bras.* fasc. vii. p. 15.—N. canescens, *N. ab E., DC. Prod.* xi. p. 67.

Hab. In Africa tropica vulgatissima, *Vogel*! *Barter*! *Mann*! *et Kirk*! *in herb. Hook.*; in insula Madagascar, ad Warrow-voai Bombatooka, *Bojer*! *in herb. cit.*

Distr. Herba neglecta per totum orbem calidiorem.

IV. ADENOSMA, *N. ab E.*

1. A. AFRICANA, *T. Anders.* Foliis submersis pinnatifidis, superioribus petiolatis, obovato-spathulatis, integris; floribus in verticillis paucifloris; corolla calycis segmentis breviore, alba; staminibus 2; ovario multiovulato.

Hab. Prope "Nupe," ad ripas fluminis "Quorra," *Barter*! *in herb. Hook.*

V. BRILLANTAISIA, *Pal. de Beauv.*

1. B. OWARIENSIS, *Pal. de Beauv. Fl. Owar. et Ben.* ii. p. 68, t. 100. f. 2.—B. Lamium, *Benth. in Fl. Nigrit.* p. 477.—Belantheria Belvisiana, *N. ab E., DC. Prod.* xi. p. 97.—Leucoraphis Lamium, *N. ab E. l. c.*

Hab. In Sierra Leone, *Whitfield*!; in insula Fernando Po, *Vogel*! *Barter*! *Mann*! *in herb. Hook.*

2. B. PATULA, *T. Anders.* Caule erecto; foliis ovatis, acutis, in petiolo decurrentibus, serratis; floribus in ramulis distichis axillaribus, divaricatis, patulis; calycis laciniis capsulam fere æquantibus, apice obtusis, reflexis; capsula apice acuta.

Hab. In Congo, *Christian Smith*! *in herb. Hook. ex herb. R. Brown.*

Suffrutex erectus, glanduloso-tomentosus. *Caulis* tetragonus, sulcatus, ad nodos tumidus. *Ramuli* floriferi 6–8 unc. longi, laterales, multiflori, dichotome ramosi. *Calycis* laciniæ vix 1 unc. longæ, lineares, obtusæ, glanduloso-hirsutæ. *Capsula* 1 unc. longa, pilis glandulosis sparsissime obtecta, polysperma.

3. B. VOGELIANA, *Benth. in Fl. Nigrit.* p. 477.

Hab. In insula Fernando Po, *Vogel*! *in herb. Hook.*

VI. NOMAPHILA, *Blume.*

1. N. LÆVIS, *N. ab E. in DC. Prod.* xi. p. 85.

Hab. In Senegambia, *Heudelot*!; in locis paludosis prope "Nupe," in Africa occidentali tropica, *Barter*! *in herb. Hook.*

2. N. CILIATA, *T. Anders.* Caule erecto, 4-angulari, nodis incrassatis, fimbriato-ciliatis; foliis sessilibus, lanceolatis, basi cordatis, glabris, integris; cymis axillaribus, paucifloris, foliosis; pedicellis filiformibus, glanduloso-hirsutis; calycis laciniis glanduloso-tomentosis; corollæ tubo calyce multo breviore.

Hab. In Congo, *Smith*! *in herb. Hook.*

Herba pedalis, erecta, subglabra. *Folia* 1–1¼ unc. longa, ½ unc. lata. *Calyx* 3 lin. longus. *Corolla* 4 lin. longa, purpurea. *Ovarium* multiovulatum.

3. N.? Lyalliana, *T. Anders.*—Echinacanthus Lyallianus, *N. ab E., DC. l. c.* p. 168.

Hab. In insula Madagascar, *Lyall*! *in herb. Hook.*

I have seen so imperfect a specimen of this plant that I am in doubt about the genus. It has certainly no affinities with *Echinacanthus*, from which the form of the capsule distinguishes it.

VII. Hygrophila, *R. Br.*

1. H. Senegalensis, *T. Anders.*—Physichilus Senegalensis, *N. ab E., DC. Prod.* xi. p. 81.

Hab. In Senegal et Senegambia, *Heudelot*! *in herb. Hook.* nn. 139 et 2838.

2. H. odora, *T. Anders.*—Polyechma odorum, *N. ab E. in DC. l. c.* p. 88.

Hab. In Senegambia, *Heudelot*, n. 807 *in herb. Hook.*!, *in herb. Mus. Paris.*

3. H. cærulea, *T. Anders.*—Polyechma cæruleum, *Hochst. in Flor. Ratis.* 1841, i. p. 376.

Hab. In Nubia, ad ripas fluminis Nili, *Schimper*! *in herb. Hook.*

4. H. micrantha, *T. Anders.*—Polyechma micranthum, *N. ab E. l. c.* p. 83.

Hab. In Senegal, *Perrottet*; ad Dagana in Senegambia, *Leprieur*! *in herb. Mus. Paris.*

5. H. Abyssinica, *T. Anders.*—Polyechma Abyssinicum, *Hochst. in Schimp. Pl. Abyss.*

Hab. In Abyssinia, *Schimper*; in regno Sennaar, *Kotschy*, n. 293!

6. H. barbata, *T. Anders.*—Physichilus barbatus, *N. ab E. l. c.* p. 82.

Hab. In Senegambia, *Heudelot*, n. 573 *in herb. Hook.*!

7. H. lutea, *T. Anders.* Erecta, scabra; caule obsolete tetragono, supra nodos tumido; foliis sessilibus, linearibus, acutis, integris, pilis rigidis asperis; floribus in verticillis axillaribus, densis, subglobosis; calycis laciniis longe lineari-subulatis, setis hyalinis ciliatis.

Hab. Ad ripas fluminis "Quorra," prope "Onitohe," *Barter*! *in herb. Hook.*

Annua?, 1–2-pedalis, pilis rigidis patentibus scabra, pauce foliata. *Folia* 2–5 unc. longa, ¼ unc. lata, linearia, acuta, basi attenuata, utrinque aspera. *Corolla* parva, lutea.

8. H. spinosa, *T. Anders. in Thwaites, Enum. Pl. Zeyl.* p. 225.—Asteracantha longifolia, *N. ab E. in DC. l. c.* p. 247, *cum syn.*—A. auriculata, *N. ab E. l. c.* p. 248.—A. macrantha, *Hochst. in Schimp. Pl.*

Abyss. n. 343.—Barleria macrantha, *R. Br. in Salt, Abyss. App.*—B. auriculata, *Schumach. Pl. Guin.* p. 285.

Hab. In paludibus locisque humidis per Africam tropicam, ad Lagos et Nupe, *Barter*!; in Senegambia, *Heudelot*!; Abyssinia, *Schimper*! *Plowden*!; Nubia, *Kotschy*!; oris Mozambique, *Forbes*! *in herb. Hook.*

Distr. Per Indiam orientalem et insulas.

VIII. CALOPHANES, *Don.*

1. C. RADICANS, *T. Anders.*—Ruellia radicans, *Hochst. in Schimp. Pl. Abyss.* nn. 17 et 177.—Dyschoriste radicans, *N. ab E. in DC. Prod.* xi. p. 106.

Hab. Prope Adoam in Abyssinia, *Schimper*! *in herb. Hook.*

2. C. MULTICAULIS, *T. Anders.*—Ruellia multicaulis, *Hochst. l. c.* n. 43.—Dipteracanthus dejectus, var. β, *N. ab E.* partim, *l. c.* p. 125.

Hab. In "Scholoda" monte Abyssiniæ, *Schimper*! *in herb. cit.*

3. C. PERROTTETII, *N. ab E. in DC. l. c.* p. 111.

Hab. Prope Fassokal in Nubia, ad lat. 11° bor., *Kotschy*! *in herb. Hook.*; ad ripas fluminis "Oti" dicti tributarii "Quorra," *Barter in herb. cit.*

4. C. NATALENSIS, *T. Anders.*—Linostylis ovata, *Sond. in Linnæa,* xxiii. p. 94.

Hab. Ad Port Natal in Africa australi, *Gueinzius*! *in herb. Sonder.*

5. C. HEUDELOTIANUS, *N. ab E. in DC. l. c.* p. 112.

Hab. In Senegambia, *Heudelot,* nn. 144 et 190 *in herb. Hook.*!

6. C. SIPHONANTHUS, *N. ab E. in DC. l. c.* p. 112.—Ruellia siphonantha, *Hils. et Bojer in herb. Hook.*

Hab. In versuris agrorum Emirnæ, provinciæ insulæ Madagascar, *Bojer*!

7. C. MAURITIANUS, *T. Anders.*—Justicia repens, *Neraud. in herb. Hook.*

Hab. In insula Mauritii, *Neraud.*! *in herb. cit.*

8. C. GRACILIS, *N. ab E. in DC. l. c.* p. 111.

Hab. In insula Madagascar, *Lyall*!

9. C. PERSOONII, *T. Anders.*—Chætacanthus Persoonii, *N. ab E. in Linnæa,* xv. p. 356.—C. glandulosus, *N. ab E. in DC. l.c.* p. 462. —Eranthemum obovatum, *E. Meyer. Cat. Pl. Drège.*

Hab. Africa australi, in collibus Kurrolike, *Burke*! *in herb. Hook.*; prope Uitenhage, *Drège*!

10. C. COSTATUS, *T. Anders.*—Chætacanthus costatus, *N. ab E. in DC. l. c.* p. 462.

Hab. In Africa australi, ad Macalisberg, *Burke*! *in herb. Hook.*

11. C. BURKEI, *T. Anders.*—Chætacanthus Burchellii, *N. ab E. in DC. l. c.* p. 462.

Hab. Ad "Thaba Unce" in Africa australi, ad lat. 31° austr., *Burke! in herb. Hook.*

Nees von Esenbeck named this species after the traveller Burchell, who he supposed had collected it. This, however, was an error, as the plant has been found only by the collector Burke, whose name therefore it ought to bear.

12. C. SETOSUS, *N. ab E. in DC. l. c.* p. 112.

Hab. Prope flumen Aapges, *Burchell;* ad Graham's Town in Africa australi, *in herb. Hook.*!

IX. RUELLIA, *Linn.*

1. R. PATULA, *Jacq. Misc.* ii. p. 358.—Ruellia matutina, *Hochst. et Steud. Pl. Ægyp.* n. 874.—Dipteracanthus patulus, *N. ab E. in DC.* xi. p. 126.

Hab. In Sennaar, *Kotschy,* n. 119!; at Elephants' Bay in Benguela, *Curror! in herb. Hook.*

Distr. In Arabia felici! India orientali! Ceylania!

2. R. PROSTRATA, *Poir. Enc. Méthod.* vi. p. 349.—Dipteracanthus prostratus, *N. ab E. in Wall. Pl. As. rar.* iii. p. 81.—D. dejectus, *N. ab E. l. c.* p. 82.

Hab. In monte "Meeramballa" dicto, atque inter Lupata et Sena, prope fluvium Zambesi, *Kirk*!

Distr. In India orientali! et Ceylania!

3. R. CYANEA, *Bojer in herb. Hook.*—Dipteracanthus cyaneus, *N. ab E. in DC. l. c.* p. 121.

Hab. In insula Madagascar, ad ripas fluminis Chazok, *Bojer,* n. 120 *in herb. Hook.*!

4. R. MONANTHOS, *Bojer in herb. Hook.*—Dipteracanthus monanthos, *N. ab E. in DC. l. c.* p. 125.

Hab. In regione centrali insulæ Madagascar, *Bojer*! *et Bouton*! *in herb. Hook.*

5. R. CURRORI, *T. Anders.* Suffruticosa; caule erecto, tomento minuto dense incano; foliis ovatis, cordatis, integris, pubescentibus; pedicellis axillaribus, solitariis, unifloris; calycis laciniis corollæ tubo dimidio brevioribus, glanduloso-pubescentibus, linearibus, acutis; corolla magna, tubo elongato, limbo infundibuliformi, lobis brevibus, æqualibus, rotundatis.

Hab. In Benguela, prope Elephants' Bay, *Curror*! n. 17 *in herb. Hook.*

Pedicelli 1 unc. longi. *Bracteæ* nullæ vel cito deciduæ. *Calyx* $\frac{1}{2}$–$\frac{3}{4}$ unc. longus. *Corolla* 3 unc. longa, extus subpubescens, cærulea?

6. R. THUNBERGIÆFLORA, *T. Anders.* Caule adscendente, inferne lignoso, tereti, supra nodos constricto, cortice cinereo, ruguloso, papillis asperis obtecto, superne herbaceo, 4-angulari, sulcato; foliis

valde petiolatis, ovato-lanceolatis, utrinque acutis, crenulato-serratis, paucinerviis, glabriusculis; floribus terminalibus, spicatis, spicis abbreviatis, paucifloris, bracteatis; calycis laciniis subæqualibus, lanceolatis, acutis, glabris; corollæ tubo calycem æquante, fauce inflato, incurvo, limbo amplo, lobis æqualibus, rotundatis, integris; ovarii loculis 14-spermis.

Hab. In insula Fernando Po, ad altitudinem 1300 ped., *Mann! in herb. Hook.*

Suffrutex 2–3-pedalis, erectus. *Folia* 3–4 unc. longa, 1–2 unc. lata; petiolus 1½ unc. longus, teres, subglaber. *Corolla* violacea, 2 unc. longa; limbus 2 unc. latus.

7. R. PILOSA, *Linn. Suppl.* p. 290.—Fabria rigida, *E. Meyer, in Cat. herb. Drèg.*—F. pilosa, *N. ab E. in DC. l. c.* p. 114, *cum syn.*

Hab. In Africa australi, ad Macalisberg, *Burke! in herb. Hook.*

8. R. OVATA, *Thunb. Fl. Capen. ed. Schult.* p. 480.—Fabria cordifolia, *N. ab E., DC. l. c.* p. 114, *cum syn.*

Hab. Ad Macalisberg, *Burke! in herb. cit.*

9. R. ZEYHERI, *T. Anders.*—Dipteracanthus Zeyheri, *Sond. in Linnæa*, xx. p. 90.

Hab. Prope fluvium "Buffalo-hunt" dictum, in Africa australi, *Zeyher! in herb. Sond.*

10. R. HUTTONII, *T. Anders.* Herbacea, erecta, pilis adpressis omnino strigosa; foliis petiolatis, ovatis, obtusis, integris; floribus axillaribus, sessilibus, solitariis vel geminis; corolla extus tomentosa, intus glabra, calyce dimidio longiore; capsula calyce breviore, glabra.

Hab. Ad "Howeson's Point,' in regione orientali Africæ australis, *Hutton! in herb. Coll. Trin. Dublin.*

Stephanophysum Baikiei, Bot. Mag. t. 5111, which was raised at Kew from plants said to have been sent from Western Africa, is *Siphonacanthus repens*, N. ab E. in Endl. et Mart. Fl. Bras. fasc. vii. p. 47 (*Stephanophysum repens*, mihi)—a species confined to Brazil. Some mistake must have occurred in recording the source from whence the plant at Kew was procured. It was probably sent from South America by Herbst, from whom a case was received at about the same time as one from Dr. Baikie, of the Niger Expedition.

X. PETALIDIUM, *N. ab E.*

1. P. LINIFOLIUM, *T. Anders.* Erectum, glabrum, ramis lignosis; foliis sessilibus, linearibus, acutis, uninerviis, glabris; pedicellis axillaribus, solitariis, unifloris; bracteis 2, concavo-ovatis, mucronatis, infra medium connatis, membranaceis, albis, nervis viridibus pulcherrime reticulatis; calycis laciniis lineari-lanceolatis, inæqualibus, extus glandu-

losis; corolla infundibuliformi, extus puberula, tubo brevi, limbo inæqualiter 5-lobo, lobo inferiore transversim corrugato.

Hab. In Damara Land, regione Africæ australis, *in herb. Coll. Trin. Dubl.* !

Suffrutex subvirgatus, glaber, bracteis pulcherrimis conspicuus. Folia 1–2 unc. longa, angustissima, coriacea. *Bracteæ* 1 unc. longæ, glabræ, corollæ tubum valvatim tegentes, persistentes. *Corolla* $1\frac{3}{4}$ unc. longa, recta; lobis patentibus; lobo inferiore corrugato, pilis reflexis sparse obtecto. *Ovarium* 4-ovulatum. *Capsulam* non vidi.

XI. PSEUDOBARLERIA, *T. Anders.*

Bracteæ 2, oppositæ, magnæ, calycem, corollam in æstivatione et capsulam tegentes. *Calyx* 4-partitus; lacinia superiore et inferiore majoribus; lateralibus minoribus, subulatis. *Corolla* infundibuliformis; tubo constricto, limbo longiore; limbo æqualiter 5-fido, lobis æqualibus, brevibus, æstivatione contortis. *Stamina* 4, inclusa; filamentis æqualibus, fauci insertis, per paria basi connatis; antheris bilocularibus, ovatis, sagittatis, basi breviter mucronatis. *Stylus* teres; stigmate subulato, basi breviter bilobato, paulo revoluto. *Capsula* ovata, acuta, a dorso compresso, verticaliter dehiscente, tetrasperma vel abortu disperma. *Semina* ovata, compressa, tomentosa, margine hyalina, in aqua mucilaginem emittentia.

1. P. HIRSUTA, *T. Anders.* Caule erecto, tetragono, hirsuto; foliis petiolatis, late ovatis, acutis, integris, hirsutis; floribus in cymis lateralibus paucifloris; bracteis ovatis, acutis, integris, pilosis; capsula compressa, glabra, fulva.

Hab. Ad oras occidentales Africæ australis extratropicæ, *Curror* ! *in herb. Hook.*

Suffrutex ? ramosus, pilis patentibus hirsutus. *Caulis* incrassatus. *Folia* cum petiolo $2\frac{1}{2}$–$3\frac{1}{2}$ unc. longa, 1–$1\frac{1}{2}$ unc. lata. *Flores* in cymis 2-3 unc. longis cum foliis bractiformibus intermixti. *Bracteæ* 1 unc. longæ, pilosæ.

XII. PHAYLOPSIS, *Willd.*

1. P. PARVIFLORA, *Willd. Sp. Pl.* iii. p. 342.—Ætheilema reniforme, *N. ab E. in Wall. Pl. As. rar.* iii. p. 94, *et in DC. Prod.* xi. p. 261, *cum syn.*—Æ. imbricatum, *N. ab E. in herb. Hook.* partim.

Hab. In insula Madagascar, prope Boinatar Bay!; in Pemba insula juxta Zanzibar!; Senegambia, *in herb. Hook.* !

Distr. In India orientali! Ceylania!

2. P. LONGIFOLIA, *Sims, Bot. Mag.* t. 2433.—Ætheilema imbricatum, *R. Br. Prod.* p. 478.—Æ. anisophyllum, *Meyer, Cat. Pl. Drèg.*—Barleria inæqualis, *Hochst. in Schimp. Pl. Abyss.* n. 367.—Ruellia imbricata, *Forsk. Descr.* p. 113.

Hab. In insula Madagascar, *Bouton* ! *Bojer* ! ; Abyssinia, prope "Dochlii," atque in monte "Scholoda," *Schimper*, nn. 367 ! et 505 ! ; Africa australi, ad Port Natal, *Krauss* ! *Sutherland* !

3. P. BARTERI, *T. Anders.* Caule erecto, tetragono, pilis reflexis subscabro ; foliis petiolatis, lanceolato-ovatis, basi attenuatis, æqualibus, supra papillis minutis crystallinis scabris, subtus glaucis, nerviis pilis adpressis asperis ; floribus in spicis terminalibus vel axillaribus subsecundis ; bracteis lanceolato-ovatis vel ovato-rotundatis, erectis, membranaceis ; calycis laciniis inferioribus supra medium connatis, lateralibus 2, brevioribus, profunde divisis, superiore spathulata, ovata, acuta, omnibus enerviis, glanduloso-hirsutis.

Hab. Ad Onitohe et Nupe, prope fluvium Quorra, *Barter* ! *in herb. Hook.*

Herba erecta. *Folia* 2–4½ unc. longa, 1–2 unc. lata, aspera ; petiolo 1½ unc. longo. *Spicæ* 1–3 unc. longæ. *Corolla* ½ unc. longa. *Ovarium* apice hirsutum. *Capsula* ignota.

XIII. WHITFIELDIA, *Hook.*

1. W. LATERITIA, *Hook. Bot. Mag.* t. 4155.

Hab. In Sierra Leone, *Whitfield in herb. Hook., et v. v. cult.*

2. W. LONGIFOLIA, *T. Anders.*—Ruellia longifolia, *Pal. de Beauv. Fl. Owar. et Ben.* i. p. 45, t. 26.—Dipteracanthus elongatus, *N. ab E. in DC. Prod.* xi. p. 140.

Hab. In regione Owariensi, ad grad. latit. 5° aust. ; in insula Fernando Po, *Vogel* ! *Barter* ! et *Mann* ! *in herb. Hook.*

XIV. BARLERIA, *Linn.*

1. B. BISPINOSA, *Vahl. Symb.* i. p. 46.—B. Hystrix β. oblongifolia, *N. ab E. in DC. Prod.* xi. p. 239.

Hab. In Abyssinia, prope Adoam, *Schimper*, n. 208 !

Distr. In Arabia felici !

The East Indian species which Nees von Esenbeck considered identical with Vahl's *Barleria bispinosa* is quite distinct from the Abyssinian specimens, which are certainly Vahl's plant. The East Indian species has greater affinities with *B. buxifolia*, Linn., than with *B. bispinosa*, Vahl. As I consider the East Indian and Ceylon plants, named by Nees von Esenbeck *B. bispinosa* and *B. spina Ceylanica*, to be one species, I propose to adopt the latter specific name, while I retain *B. bispinosa*, Vahl, for the Abyssinian and Arabian plant.

2. B. ACANTHOIDES, *Vahl. Symb.* i. p. 47.—B. triacantha, *Hochst. in Schimp. Pl. Abyss.* n. 1004.—B. candida, *N. ab E. in DC. l. c.* p. 240.—B. eranthemoides, *R. Br.*

Hab. In Abyssinia, prope Adegannam et fluvium Tacaz, *Schimp.* nn. 1004 ! et 1856 ! ; Nubia et regno Kordofan, *Kotschy* !

Distr. In Arabia felici ! Muscat ! Scinde !

3. B. Prionitis, *Linn. Sp. Pl.* 887.—B. Hystrix, *Linn. Mant.* p. 89. —B. diacantha, *Hochst. in Schimp. Pl. Abyss.* n. 1008 et 1922.—B. hypocrateriformis, *Hochst. l. c.* n. 2194.—B. brevispina, *R. Br. in Salt. Abyss. App.*

Hab. In Abyssinia, prope Adegannam atque in montibus prope Dochadsa, ad altitudinem 5000 ped.; in insula Mauritio vix spontanea, sed ab India orientali introducta.

4. B. stimulans, *E. Mey. in Cat. Pl. Drèg.*; *N. ab E. in DC. l. c.* p. 241.

Hab. In Africa australi, ad fluvium "Gamka," *Burke*! *in herb. Hook.*; *Drège*! *in herb. Sond.*

5. B. irritans, *N. ab E. DC. l. c.* p. 236.—B. pungens, *Thunb. Fl. Cap., ed. Schult.* p. 458.

Hab. In Africa australi, ad Uitenhage, *Drège*! *Zeyher*!

6. B. ilicina, *E. Mey. MSS.* (absque descriptione). Erecta, glabra, caule tereti; foliis breviter petiolatis, ovatis, apice spinosis, margine spinoso-dentatis; bracteis simplicibus, rigidis, apice et margine spinosis; calycis laciniis exterioribus ovatis, margine longe spinoso-dentatis, membranaceis, glabris, reticulatis, interioribus lanceolatis, spinosis, uninerviis. Corollam et capsulam non vidi.

Hab. In locis rupestribus ad fluvium Garip in Africa australi, *Drège*! *in herb. Sond.*

7. B. pungens, *Linn. Suppl.* p. 290, et *N. ab E. DC. l. c.* p. 236.—Crabbea pungens, *Harv. Gen. South-Afric. Pl.* 276.

Hab. In Africa australi, ad Uitenhage, *Drège*! *in herb. Sond.*; Caffraria, *Brownlee*!; Grahamstown, *Bolton*!; Albany, *Williams*!

8. B. Meyeriana, *N. ab E., DC. l. c.* p. 230, *cum syn.*

Hab. Ad Port Natal in Africa australi, *Drège*! *Gueinzius*! *in herb. Hook.*

9. B. lancifolia, *T. Anders.* Erecta, pruinosa; foliis lineari-lanceolatis, acutis, integerrimis, mucronulatis; floribus sessilibus, axillaribus, solitariis; bracteis herbaceis, erectis, linearibus, calyce dimidio brevioribus; calycis laciniis herbaceis, integris, glandulosis, exterioribus ovatis vel ovato-lanceolatis, acutis, interioribus brevioribus, lanceolatis corolla infundibuliformi, tubo brevissimo, fauce dilatata, lobis late ovato-rotundatis; staminibus fertilibus 2, inclusis, filamentis basi connatis, anantheris 3 brevissimis; ovulis 4; capsula rostrata, glanduloso-tomentosa.

Hab. In Damara Land, regione Africæ austro-occidentalis, *in herb. Coll. Trin. Dubl.*

Suffrutex parvus. *Caulis* teres, cortice cinereo, pruinoso. *Folia* 1–2 unc. longa, juniora puberulo-glandulosa. *Bracteæ* 3 lin. longæ, angustissime lineares. *Calycis* laciniæ exteriores 3–6 lin. longæ. *Corolla* 1½ unc. longa, pulchra, limbo amplo, lobis patentibus.

10. B. DAMARENSIS, *T. Anders.* Erecta, pubescens; foliis petiolatis, ovatis, acutis, mucronatis, integris, puberulis; bracteis late subulatis, mucronatis; calycis laciniis lanceolatis, mucronulatis, integris, puberulis; exterioribus 5–7-nerviis; interioribus paulo brevioribus, glandulosis, uninerviis; corolla subhypocraterimorpha, extus puberula, tubo æquali, calyce duplo longiore, lobis ovatis patentibus; staminibus fertilibus 2, exsertis, sterilibus 2, alteris multo brevioribus.

Hab. In Damara Land, *herb. Coll. Trin. Dubl.*

The character of the outer segments of the calyx, the form of the corolla (especially of the tube) and the exserted stamens, sufficiently distinguish this species from its allies *B. Meyeriana* and *lancifolia*.

11. B. HOCHSTETTERI, *N. ab E. in DC. l. c.* p. 231.—B. Aucheriana, *N. ab E. l. c.* p. 234.

Hab. In Nubia et regno Kordofan, *Kotschy*, n. 119!

Distr. In Arabia felici! Muscat! Scinde!

12. B. PARVIFLORA, *R. Br. in Salt. Abyss. Append.* (absque descriptione). Caule erecto, ramis teretibus, divaricatis, junioribus pilis adpressis incano tomentosis; foliis obtuse lanceolatis vel ovatis, basi cordatis, mucronulatis, integerrimis, glaucis; floribus axillaribus, pedicellatis, solitariis vel geminis; bracteis ovatis, acutis, concavis, carinatis, integris, herbaceis, uninerviis; calycis laciniis herbaceis, carinatis, exterioribus bracteis brevioribus, ovato-lanceolatis, acutis; interioribus subulatis, exterioribus brevioribus; corolla campanulato-infundibuliformi, glabra, limbi lobis obovato-rotundatis; staminibus fertilibus 2, inclusis, anantheris 3; capsula rostrata, disperma, fusca, glabra; seminibus tomentosis.—*B. cordifolia*, Hochst. in Schimp. Pl. Abyss.

Hab. In montibus prope Tazeroo, oppidum Abyssiniæ, ad altitudinem 3500 ped., *Schimp.* n. 2291!

Suffrutex erectus, 1–2-pedalis. *Rami* divaricati; vetustiores lignosi, cortice fusco vel glauco; juniores incano-tomentosi. *Folia* ¼–1½ unc. longa, 3 lin.–¾ unc. lata. *Calyx* 3 lin. longus. *Corolla* ½ unc. longa.

13. B. ORBICULARIS, *Hochst. l. c.* (absque descriptione). Erecta, ramosa; foliis petiolatis, ovatis, integerrimis, pilis strigosis pubescentibus; floribus pedicellatis, axillaribus, solitariis vel in cymulis axillaribus paucifloris confertis; bracteis parvis, herbaceis, obovato-spathulatis, integris; calycis laciniis exterioribus magnis, late rotundo-cordatis, subherbaceis, superiore apice breviter bimucronulata, inferiore integra, interioribus brevissimis, subulatis; corolla subinfundibuliformi, limbo breviter 5-lobo; staminibus fertilibus 2, inclusis; capsula rostrata, disperma, tomentosa.

Hab. Abyssinia, in montibus prope Tazeroo, ad altitudinem 3300 ped., *Schimper*, n. 2189!

Suffrutex 1–2-pedalis. *Rami* divaricati, teretes, pubescentes. *Folia* cum petiolo 1–2 unc. longa, ¾ unc. lata, herbacea. *Cymulæ* 3–5-floræ, axillares. *Bracteæ* ½ unc. longæ. *Calycis* laciniæ exteriores 10 lin. longæ, 9 lin. latæ, virides, interiores 2 lin. longæ. *Corolla* parva, inconspicua, calyce plus minus occulta. *Capsula* 5 lin. longa, fulva, tomentosa. *Semina* ovata, compressa; testa carnosa.

14. B. VENTRICOSA, *Hochst. l. c.* et *N. ab E. in DC. l. c.* p. 230.
Hab. In dumetis partis inferioris "Scholoda" montis Abyssinici, *Schimper*, nn. 42! 1903!

15. B. GRANDIFOLIA, *R. Br. Salt. Abyss. Append.*—B. grandis, *Hochst.* et *N. ab E., DC. l. c.* p. 233.
Hab. In monte Sinai, prope Adoam oppidum Abyssinicum, *Schimper*, n. 702!

16. B. KIRKII, *T. Anders.* Tomentosa; caule obsolete tetragono; foliis ovatis, lanceolatis, acutis, integerrimis, pilosis; floribus in cymulis brevissimis axillaribus, vel subsessilibus solitariis; calyce reticulato-membranaceo, pubescente, laciniis exterioribus oblongis, apice mucronatis, margine acute dentatis subspinosis, interioribus minoribus subulato-lanceolatis; capsula subovata, brevissime rostrata, nigra, nitida. Corollam non vidi.
Hab. Ad Kaurabassa, prope Tette, in Africa austro-orientali tropica, *Kirk*!
Planta subherbacea, pilis floccosis omnino tomentosa. *Folia* ½–1 unc. longa, ¼ unc. lata, pilis floccosis et simplicibus utrinque obtecta. *Cymulæ* 3–4-floræ. *Flores* approximatæ. *Bracteæ* calyce breviores, rigidæ, acute spinosæ, superne canaliculatæ, tomentosæ. *Calycis* laciniæ exteriores 8 lin. longæ, varie 5–7-spinosodentatæ.

17. B. GUEINZII, *Sond. in Linn.* xxiii. p. 91.
Hab. In Africa australi, ad Natal, *Gueinzius*! *in herb. Sonder., Sutherland*! *in herb. Hook.*

18. B. RUELLIOIDES, *T. Anders.* Inermis; caule subtetragono; foliis breviter petiolatis, ovatis, utrinque attenuatis, integris, superne glabris, subtus glaucis; bracteis minutis, herbaceis, subulatis; calycis laciniis exterioribus magnis, late ovatis, acutis, integris, pubescentibus, interioribus minutis subulatis; corolla infundibuliformi; capsula obovata, erostrata, mucronata, chartacea, glabra, fulva; seminibus 2, magnis, ovatis, fulvo-sericeis.
Hab. Nupe ad ripas fluminis "Quorra," *Barter*!
Subherbacea, 3-pedalis, erecta, pauce ramosa, partibus junioribus pilis strigosis pubescentibus. *Caulis* ad angulos pilis adpressis sparse obtectus. *Folia* 2–4 unc. longa, 8 lin.–1¾ unc. lata, herbacea, paucinervia, ad nervos utrinque subaspera; petiolo 3–4 lin. longa. *Calycis* laciniæ exteriores 8 lin. longæ, 5 lin. latæ, ciliatæ. *Corolla* 1½ unc. longa, glabra, cærulea; lobis æqualibus. *Capsula* 5 lin. longa, 3 lin. lata, calyce occulta.

19. B. Boivinii, *T. Anders.* Erecta, ramosa; caule tetragono, sulcato, cortice glauco; foliis petiolatis, lanceolato-ovatis, acuminatis, integris, glabris; cymis terminalibus, paucifloris, abbreviatis; bracteis herbaceis, linearibus, acutis, calyce brevioribus; calyce subherbaceo, laciniis exterioribus oblongis obtusis, interioribus brevioribus, lineari-lanceolatis, tomentosis, margine ciliatis; corolla anguste infundibuliformi, profunde 5-lobata, extus pubescente, intus glabra; staminibus fertilibus 2, inclusis, sterilibus 3; capsula obovata, erostrata, mucronata, glabra, fusco-nigrescente, disperma.

Hab. In insula Madagascar, *Boivin*!

Suffrutex erectus, inermis, glaber, cortice glauco. *Folia* 2–3½ unc. longa, 1–½ lata, herbacea, glabra, subtus ad nervos pilis adpressis tomentosa. *Calyx* 5–6 lin. longus, 2–3 lin. latus, lacinia inferiore apice paulo bidentata. *Corolla* 2 lin. longa, cærulea; tubo elongato. *Stamina* sterilia brevissima.

20. B. repens, *N. ab E. in DC. l. c.* p. 230.

Hab. In insula Pemba, in locis humidis, *Bojer*?; in insula Raza, ad oras Africæ orientalis, *Forbes*! *in herb. Hook.*

21. B. obtusa, *N. ab. E. in Linn.* xv. p. 358, *et in DC. l. c.* p. 231.—B. diandra, *Schlechtend. in herb. Drèg.*—B. barbata, *E. Mey. in Pl. Drèg.*

Hab. Ad Uitenhage, *Drège*! *Harvey*!; Port Natal, *Grant*! *Burke*! *Plant*! *Sutherland*! *Sanderson*!

22. B. opaca, *N. ab E. in DC. l. c.* p. 230.

Hab. Ad Accra, in oris Africæ occidentalis tropicæ, *Don*!

23. B. Burkeana, *Sond. in Linn.* xxiii. p. 92.—B. Burchelliana *et* macrostegia, *N. ab E. in DC. l. c.* p. 235.

Hab. Prope flumen "Vet River" in Africa australi, *Burke*! *in herb. Hook.*

24. B. ovata, *Meyer, Cat. Pl. Drèg., N. ab E. l. c.* p. 230.

Hab. In territorio Cap. Bon. Spei, *Drège*! *in herb. Hook.*

25. B. papillosa, *T. Anders.* Erecta, spinosa; caule subtereti, glauco; foliis subsessilibus, ovatis, spinoso-dentatis, coriaceis, papillosis; floribus axillaribus solitariis atque in spicis terminalibus confertis; bracteis linearibus, spinosis, acutis, margine spinosis; calycis laciniis exterioribus magnis, ovatis, apice spinoso-mucronatis, margine spinoso-dentatis, reticulato-nervosis, glanduloso-pubescentibus, interioribus lineari-lanceolatis, mucronatis, uninerviis, exterioribus brevioribus; corolla subhypocraterimorpha, lobis obovatis, apice rotundatis; staminibus fertilibus 2, exsertis.

Hab. In Namaqualand, regione Africæ australis, *Wyley*! *in herb. Harvey.*

Suffrutex erectus. *Caulis* divaricatus, nodis approximatis. *Folia* 3 lin. longa, 1–2 lin. lata, crassa, coriacea, papillis obtusis utrinque obtecta.

Spicæ 2–3 unc. longæ. *Bracteæ* rigidæ et acute spinosæ, superne canaliculatæ, vetustiores albescentes. *Calycis* laciniæ exteriores 6 lin. longæ, 4–5 lin. latæ. *Corolla* 1 lin. longa, extus puberula, purpurea.

26. B. FLAVA, *Jacq. Eclog.* p. 67. t. 46; *N. ab E. l. c.* p. 224.—B. Senegalensis, *N. ab E. l. c.*
Hab. In Senegambia, ad ripas fluvii Rio Nunoz, *Heudelot*! n. 644 *in herb. Hook.*

For many years this species has been a favourite plant in our stoves, to which it was introduced from the Jardin des Plantes at Paris. It was always considered an Arabian plant,—an error which originated with Jacquin. Nees von Esenbeck, though he detected Jacquin's mistake, added to the confusion by quoting Equatorial America as the native country of *B. flava*. At the same time, he remarks that his *B. Senegalensis* is perhaps the origin of the cultivated plant. In this he is certainly correct; for, after a careful comparison of Heudelot's Senegal specimens with living and dried ones of the garden plant, I can find no difference between them. I have therefore united the two species, and adopted Jacquin's very appropriate specific name.

27. B. LUPULINA, *Lindl. Bot. Reg.* t. 1483, *N. ab E. l. c.* p. 237.—B. macrostachya, *Boj. Hort. Maurit.* p. 260.
Hab. In locis aridis in insula Madagascar, *Bojer*! *in herb. Hook.*

28. B. HALAMOIDES, *N. ab E. l. c.* p. 231.
Hab. In oris Africæ austro-occidentalis extratropicæ, *Curror*! *in herb. Hook.*

29. B. ACANTHOPHORA, *N. ab E. l. c.* p. 726.
Hab. Ad Mozambique, *Loureiro.*

XV. CRABBEA, *Harv.*

1. C. NANA, *N. ab E. in DC. Prod.* xi. p. 162, *cum syn.*—C. cirsoides, *N. ab E. l. c.* p. 163, *cum syn.*
Hab. In Africa australi ad "Seven Fountains," prope fluvium "Vaal," *Burke*! *in herb. Hook.*; *Drège*! *et Ecklon et Zeyher*!

2. C. HIRSUTA, *Harv. in Lond. Journ. of Bot.* i. p. 27, *N. ab E. l. c.*
Hab. Ad Port Natal in Africa australi, *in herb. Trin. Coll. Dubl.*

3. C. ANGUSTIFOLIA, *N. ab E. l. c.*
Hab. Ad Macalisberg in Africa australi, *Burke*! *in herb. Hook.*

XVI. LANKESTERIA, *Lindl.*

1. L. HISPIDA, *T. Anders.*—Eranthemum hispidum, *N. ab E. in DC. Prod.* xi. p. 456, *cum syn.*—Lankesteria parviflora *et* L. longiflora, *Lindl. Bot. Reg.* xxxii. t. 12.
Hab. In Sierra Leone, *Don*!, *Barter*! *in herb. Hook.*

2. L. ELEGANS, *T. Anders.*—Eranthemum elegans, *R. Br.*, *N. ab E. l. c.* p. 447, *cum syn.*
Hab. In sylvis prope Abeokuta, *Barter*! *in herb. Hook.*

XVII. CROSSANDRA, *Salisb.*

1. C. GUINEENSIS, *N. ab E.*, *DC. Prod.* xi. p. 281.
Hab. In oris Guineæ, *in herb. Hook.*!; in insula Fernando Po, *Mann*!

2. C. MADAGASCARIENSIS, *T. Anders.*—Polythrix Stenandrium, *N. ab E. l. c.* p. 286.
Hab. In montibus provinciæ Emiræ et in sylvis loci "Be' fourem" dicti insulæ Madagascar, *Bojer*! *in herb. Hook.*

3. C. FLAVA, *Hook. Bot. Mag.* t. 4710.
Hab. In insula Fernando Po in monte "Sugar-loaf" dicto, *Whitfield. V. cult.*

XVIII. LEPIDAGATHIS, *Willd.*

1. L. RADICALIS, *Hochst. in Schimp. Pl. Abyss.*; *N. ab E.*, *DC. Prod.* xi. p. 255.
Hab. In Abyssinia locis siccis calidis apricis prope Axum, n. 1525! et in rupibus schistosis prope Adoam, n. 1072, *Schimper*!

2. L. ANOBRYA, *N. ab E. l. c.*
Hab. In Senegambia, *Heudelot in herb. Hook.* n. 204!

3. L. HEUDELOTIANA, *N. ab E. l. c.* p. 254.
Hab. In Senegambia, ad fluvium Rio Nunoz, *Heudelot in herb. Hook.* n. 666!

4. L. MOLLIS, *T. Anders.* Erecta; caule tetragono, aspero; foliis sessilibus, lineari-lanceolatis, mucronulatis, superne scabris, subtus tomentosis, trinerviis; floribus in spicis radicalibus et caulinibus confertis; bracteis lanceolatis, acutis, breviter aristatis, membranaceis, tomentosis, ciliatis; calycis laciniis membranaceis, uninerviis, tomentosis, ciliatis, majoribus 2 lanceolatis, minoribus 3 linearibus; corolla bilabiata fauce setis deflexis clausa; staminibus 4, inclusis; filamentis æqualibus.
Hab. In collibus saxosis ad Nupe prope fluvium Quorra, *Barter*! *in herb. Hook.*
Suffruticulus basi lignosus. *Caules* a radice 2–3 vel plurimi, adscendentes, pedales. *Folia* 2–3½ unc. longa, 3 lin. lata, rigida. *Spicæ* ovatæ vel subglobosæ, fulvæ, pilis albo-sericeis tomentosæ; radicales plures, dense confertæ; caulinæ pauciores, laterales, non verticillatæ. *Corolla* ¾ unc. longa, flava, intus maculis fulvis notata.

5. L. TERMINALIS, *Hochst. in Schimp. Pl. Abyss.*; *N. ab E. l. c.* p. 251.
Hab. Ad rupes in locis siccis infra Sessaquilla in Abyssinia, *Schimper*, n. 815! et 1920! *in herb. Hook.*; e regno Fayzokl, *Kotschy*, n. 482!

6. L. CALYCINA, *Hochst. l. c.*; *N. ab E. l. c.* p. 252.

Hab. In Abyssinia, prope Tazeroo, alt. 3500 ped., *Schimper*, n. 2190!

Distr. In Scinde!

7. L. GLANDULOSA, *N. ab E. l. c.* p. 243.—Barleria glandulosa, *Hochst. in Schimp. Pl. Abyss.*

Hab. In Abyssinia ad montem Scholoda, *Schimper*, n. 44!

8. L. HYSSOPIFOLIA, *T. Anders.*—Teliostachya hyssopifolia, *Benth. in Fl. Nigrit.* p. 481.

Hab. Sierra Leone, *Don*!

9. L. LAGUROIDEA, *T. Anders.*—Teliostachya laguroidea, *N. ab E. l. c.* p. 264.

Hab. Accra in oris Africæ orientalis ad lat. bor. 5°, *Vogel*!; ad ripas fluvii "Oty" tributarii Quorra, *Barter*!

I have seen a species of *Lepidagathis* in the Kew Herbarium among a collection of plants made in Congo by Christian Smith. It is closely allied to the Asiatic species *L. fasciculata*, but the specimen is too imperfect for specific determination.

XIX. BLEPHARIS, *Juss.*

1. B. BOERHAAVIÆFOLIA, *Juss.*; *N. ab E., DC. Prod.* xi. p. 266, *cum syn.*

Hab. In Congo, *C. Smith*! in Senegambia, *Heudelot*! Abyssinia in monte Scholoda et montanis prope Axum, *Schimper*, nn. 247! 1492! 1895!; in Guinea, *Thonning*! *in herb. Sonder.*

Distr. India orientali, Ceylania et Java.

2. B. GUEINZII, *T. Anders.*—B. boerhaaviæfolia, var. micrantha, *Sond. in Linn.* xxiii. p. 92.

Hab. Ad Port Natal in Africa australi, *Gueinzius*! *in herb. Sonder.*

3. B. SATURIÆFOLIA, *Pers. Syn.* ii. p. 180; *N. ab E. l. c.* p. 265, *cum syn.*

Hab. In Africa australi extratropica ad fluvium "Vat" et Grahamstown, *Burke*!; ad Port Natal, *Krauss*!, *Drège*! *in herb. Hook. et Sond.*; ad fluvia "Aapges" et "Vat."

4. B. PUNGENS, *Klotzsch in Peters, Mossamb. Bot.* p. 211. Caule ramoso, tereti; foliis sessilibus, lineari-lanceolatis, apice acutissime acicularibus, margine spinoso-serratis, uninerviis, utrinque glanduloso-puberulis; floribus axillaribus, solitariis, sessilibus; bracteis lanceolatis, acutis, apice spinoso-serratis, 3-nerviis, pubescentibus; calycis laciniis pubescentibus, superiore inferiore paulo longiore.

Hab. In Africa orientali tropica ad fluvium Zambesi, *Kirk*!

Suffruticulus elegans, vix pedalis, ad basin lignosus. *Caulis* cortice cinereo, pubescente. *Calyx* profunde 4-partitus, lacinia superiore integra, 3-nervia; inferiore bidentata, 2-nervia; lateralibus subulatis, integris, uninerviis. *Corolla* tubo brevi, limbo unilabiato, labio trifido, linea media callosa 3-nervia. *Stamina* 4, subæqualia. *Ovarium* biovulatum. *Capsula* glabra, subchartacea. *Semina* testa muricata.

5. B. ANGUSTA, *T. Anders.*—Acanthodium angustum, *N. ab E. l. c.* p. 273.
Hab. In Africa australi prope "Schoon strom," *Burke*! *in herb. Hook.*; ad "Nonderfontzs," *Zeyher*!; Natal, *Owen*! *in herb. Trin. Coll. Dubl.*

6. B. PROCUMBENS, *Pers. Synops.* ii. p. 180.—Acanthodium procumbens, *N. ab E. l. c.* p. 273, *cum syn.*—A. diversispinum, *N. ab E. l. c.* p. 275.
Hab. In Africa australi prope Uitenhage et in collibus juxta fluvium Zwartkop, *Drège*!, *Ecklon et Zeyher*!

7. B. FURCATA, *T. Anders.*—Acanthodium furcatum, *N. ab E. l. c.* p. 276, *cum syn.*—A. macrum, *N. ab E. l. c.*
Hab. In Africa australi ad Port Natal, *Sutherland*!; ad fluvium "Gamka," *Burke*! Namaqualand, *Wyley*!; ad Springbok Kral, *Zeyher*! *Drège et Ecklon in herb. Sonder*!

8. B. CAPENSIS, *Pers. Syn.* ii. p. 180.—Acanthodium Capense, *N. ab E. in Linn.* xv. p. 361, *et DC. l. c.* p. 276, *excl. var.* β. *et* δ.—Acanthus Capensis, *Linn.*, *Thunb. Fl. Cap.* ii. p. 455.
Hab. Per Africam australem extratropicam vulgatissima, *Drège*!, *Ecklon et Zeyher*!, *Sanderson*! *in herb. Hook.*, *Trin. Coll. Dubl. et Sonder.*

9. B. HIRTINERVIA, *T. Anders.*—Acanthodium hirtinervium, *N. ab E. l. c.* p. 277.—A. Capense, var. β. et δ. villosum, *N. ab E.*, *DC. l. c.* p. 276.
Hab. Ad Uitenhage, *Drège*!; ad Fish River, *Burke*!; Somerset, *Bowker*! *in herb. Hook.*

10. B. SQUARROSA, *T. Anders.*—Acanthodium squarrosum, *N. ab E. in DC. l. c.* p. 275.
Hab. In Africa australi ad fluvium "Kat" dictum, *Burke*! *in herb. Hook.*; ad Grahamstown, *Bolton*!

11. B. CARDUIFOLIA, *T. Anders.*—Acanthodium carduifolium, *N. ab E. l. c.* p. 278, *cum syn.*—A. Hoffmannseggianum, *N. ab E. l. c.* p. 277.
Var. glabra, *T. Anders.*—Acanthodium glabrum, *N. ab E. l. c.* p. 278, *cum syn.*
Hab. In Africa australi ad Cannisberg; Namaqualand, *Drège*! *in herb. Hook. et Sonder.*

12. B. SPATHULARIS, *T. Anders.*—Acanthodium spathulare, *N. ab E. l. c.* p. 277, *cum syn.*
Hab. In Namaqualand, *Drège*! *in herb. Sonder.*

I have seen only a very imperfect specimen of this species.

13. **B. GLAUCA**, *T. Anders.*—Acanthodium glaucum, *N. ab E. l. c.* p. 277.
Hab. In montibus Namaqualand inter "Elephant River et Kaus," ad lat. 22° aust., *Drège*!

Both this and the preceding species very much resemble *B. carduifolia.*

14. **B. GROSSA**, *T. Anders.*—Acanthodium grossum, *N. ab E. l. c.* p. 274.
Hab. In oris Africæ austro-occidentalis versus tropicam, *Curror*! *in herb. Hook.*

15. **B. LINARIÆFOLIA**, *Pers. Synops.* ii. p. 180.—Acanthodium hirtum, *Hochst. in Kotsch. Pl. Nub.* n. 256; *N. ab E. l. c.* p. 274.
Hab. In Senegambia, *Heudelot*, n. 179! *in herb. Hook.*; prope Nupe ad ripas fluvii Quorra, *Barter*!

There is a *Blepharis* found in Scinde and the Punjab which is figured by Wight in the 'Icones,' t. 1535 & 1536, as *Acanthodium grossum*, N. ab E., while the specimens of it in the Kew Herbarium are referred by Planchon to *Acanthodium hirtum*, Hochst. The Scinde plant is quite distinct from both of these species, though it is nearly allied to the last one. In an Enumeration of East Indian Acanthaceæ which I am preparing in uniformity with Hooker and Thomson's Præcursores, I have adopted Stock's MS. name for this species, *B. Scindica.*

16. **B. EDULIS**, *Pers. Synops.* ii. p. 180.—Acanthodium spicatum, *Delil., N. ab E. l. c.* p. 274, *cum syn.*—Acanthus tetragonus, *R. Br. in Salt. Abyss. Append.*
Hab. In Abyssinia, in convalle Dallub, *Roth*!; Nubia, *Kotschy*, n. 33!; Ægypto in deserto inter Suez et Cairo, *Madden*!
Distr. In Arabia petræa! et felici! Muscat! Beloochistan!

XX. ACANTHOPSIS, *Harv.*

1. **A. HORRIDA**, *N. ab E., DC. Prod.* xi. p. 278, *cum syn.*
Hab. In Africa australi, *Drège*! *in herb. Hook. et Trin. Coll. Dubl.*; *Ecklon et Zeyher*! *in herb. Sonder.*

2. **A. DISPERMA**, *Harvey in Hook. Journ. Bot.* i. p. 28; *N. ab E., DC. l. c. cum syn.*
Hab. In Africa australi ad fluvium "Garip" in regione "Little Namaqualand" dicta, *Drège*! *in herb. Hook. et Sonder.*

XXI. ACANTHUS, *Linn.*

1. **A. ILICIFOLIUS**, *Linn. Sp. Pl.* p. 639.—Dilicaria ilicifolia, *N. ab E., DC. l. c.* p. 268, *cum syn.*
Hab. Prope Uitenhage, *Wendemann*! *in herb. Sonder.*
Distr. Per totam Asiam tropicam in locis maritimis.

2. A. **Kirkii**, *T. Anders.* Caule tereti, glabro; foliis ovatis, acutis, basi in petiolum attenuatis et decurrentibus, integerrimis, glabris; spicis terminalibus, brevibus, bracteatis, bracteis magnis, concavis, late ovatis, obtusis, mucronulatis, nitidis, margine membranaceis; calycis laciniis lanceolatis, acutis, duriusculis, glabris; corollæ labio 5-lobo, lobis rotundatis; filamentis æqualibus, glabris; ovarii loculis biovulatis.

Hab. Ad altitudinem 2000 ped. in Moramballa montem Africæ orientalis tropicæ, *Kirk*!

Frutex subvolubilis, glaber, inermis. *Folia* herbacea, ovata, utrinque glabra, petiolata, cum petiolo 6–10 unc. longa, 3–4 unc. lata. *Flores* magnæ, glabræ, suaveolentes.

3. A. **Barteri**, *T. Anders.* Caule lignoso, tereti; foliis petiolatis, ovatis, acuminatis, mucronatis, margine serrato-dentatis, spinosis, utrinque scabris; spicis terminalibus; bracteis lanceolatis, margine et apice longe spinosis; capsula magna, glabra, valvis subchartaceis.

Hab. Ad Onitshe in Africa tropica prope fluvium Quorra, *Barter*!

Suffrutex 3-pedalis. *Caulis* glaber. *Folia* cum petiolo 6–9 unc. longa, 3–4 unc. lata, superne scabra, subtus asperrima. *Spicæ* 5 unc. longæ. *Calycem corollam*que non vidi.

4. A. **montanus**, *T. Anders.*—Cheilopsis montana, *N. ab E. l. c.* p. 272, *syn. exclus.*

Hab. In montibus insulæ Fernando Po, *Vogel*! *in herb. Hook.*

5. A. **mollis**, *Linn. Sp. Pl. ed. Willd.* iii. p. 397; *N. ab E. l. c.* p. 270.

Hab. Ad oppidum "Algiers" in Africa boreali, *Jamin*! *in herb. Hook.*

Distr. In oris septentrionalibus maris Mediterranei atque in Europa australi.

6. A. **arboreus**, *Forsk. Descr.* p. 115.—Cheilopsis arborea, *N. ab E. l. c.* p. 272.—C. polystachya, *Moq.-Tand. in Ann. Sc. Nat.* sér. 1. t. xxvii. p. 230; *N. ab E. l. c.* p. 273.

Hab. In regno Fayzokl, *Kotschy*, n. 489!; Abyssinia, *Plowden*! *in herb. Hook.*

XXII. Sclerochiton, *Harvey*.

1. S. **Harveyanus**, *N. ab E., DC. l. c.* p. 279.

Hab. Ad "Orange River" fluvium Africæ australis, *Burke*! *in herb. Hook.*; *Drège*! *in herb. Hook. et Sonder.*

2. S. **Vogelii**, *T. Anders.*—Isacanthus Vogelii, *N. ab E. l. c.*

Hab. Ad promontorium Palmas Africæ occidentalis, *Vogel*!, *Ansell*! *in herb. Hook.*

XXIII. Duvernoia, *E. Mey.*

1. D. **Adhatodoides**, *E. Mey. Pl. Cat. Drèg.*; *N. ab E., DC. Prod.* xi. p. 323.

Hab. In Africa australi in regione promontorii Bonæ Spei, *Drège*! *in herb. Hook. et Sonder.*

XXIV. JUSTICIA, *Linn.*

Sect. 1. **BETONICA.** *Floribus terminalibus axillaribusve, spicatis; bracteis imbricatis. Frutices vel suffrutices.*

† *Spicis terminalibus.*

1. J. **SCHIMPERIANA,** *T. Anders.*—Adhatoda Schimperiana, *Hochst. in Schimp. Pl. Abyss.*; *N. ab E., DC. Prod.* xi. p. 388, *cum syn.*

Hab. In Abyssinia ad montes prope Axum et in vallibus apricis prope Adoam, *Schimper*, nn. 27! et 1549!

2. J. **BETONICA,** *Linn.*—A. Betonica, *N. ab E. l. c.* p. 385.—A. variegata, *N. ab E. l. c. cum syn.*—A. lupulina, *N. ab E. l. c. cum syn.*—A. cheiranthifolia, *N. ab E. l. c.* p. 387.

Hab. In collibus siccis prope Dochli pagum "Sana" districtus Abyssiniæ, *Schimper*, n. 516!; in Africa australi ad fluvium Aapges et ad Macalisberg, *Burke*!; ad Port Natal, *Williamson*! *in herb. Hook.*

3. J. **MACULATA,** *T. Anders.* Caule scandente seu volubile; foliis petiolatis, ovatis, apice acutis vel acuminatis, integris, utrinque glabris; spicis in ramis terminalibus, brevibus; bracteis bracteolisque parvis, subulatis; calycis laciniis lanceolatis, bracteis longioribus extus glabriusculis, intus puberulis; corolla intus maculis purpureis dense notata, extus pubescente, tubo brevi, dilatato; staminibus exsertis, antheris loculo inferiore breviter calcarato; ovario styloque tomentosis.

Hab. In insula Fernando Po, *Mann*!

Frutex 10–15-pedalis, scandens. *Caulis* lignosus, teres, cortice rubescente. *Folia* 3–6 unc. longa, 2–3½ unc. lata, basi obtusa, subtus paucinervia; petiolus 1–2 unc. longus. *Spicæ* 3–4 unc. longæ, sublaxæ, pilis adpressis puberulæ. *Bracteæ* 2–3 lin. longæ. *Corolla* magna, 1 unc. longa, alba, maculis purpureis notata.

†† *Spicis axillaribus, oppositis.*

4. J. **TRISTIS,** *T. Anders.*—A. tristis, *N. ab E. l. c.* p. 404.

Hab. In insula Fernando Po, *Vogel*!, *Mann*!

Sect. 2. **ROSTELLARIA.** *Floribus terminalibus spicatis, vel axillaribus subsolitariis; bracteis ciliatis. Plantæ herbaceæ, plerumque neglectæ.*

† *Floribus terminalibus spicatis.*

5. J. **NATALENSIS,** *T. Anders.*—A. Natalensis, *N. ab E. l. c.* p. 391.

Hab. In Africa australi ad Port Natal, *Krauss*! *in herb. Hook., et Bentham, Sanderson*!, *Sutherland*!

6. J. **PALUSTRIS,** *T. Anders.*—A. palustris, *N. ab E. l. c.* p. 402, *cum syn.*—A. Kotschyi, *N. ab E. l. c.* p. 397, *cum syn.*

Hab. In regno Kordofan, *Kotschy*, n. 61!; Abyssinia, in agris otiosis prope Goelbb, ad altitudinem 4000 ped., *Schimper*, nn. 1211! et 2156!

7. J. MAJOR, *T. Anders.*—A. major, *N. ab E. l. c.* p. 397, *cum syn.*
Hab. In Abyssinia ad ripas fluvii Tacaze sub arborum umbra, *Schimper*, n. 1251!

8. J. MINOR, *T. Anders.*—A. minor, *N. ab E. l. c.* p. 400, *cum syn.*
Hab. In Abyssinia montibus prope Tazeroo, locis aridis, alt. 4000 ped., *Schimper*, n. 2296!

J. major and *J. minor* will probably prove to be states of one species.

9. J. PLICATA, *Vahl, En.* i. p. 157.—A. plicata, *N. ab E. l. c.* p. 401.
Hab. In Africa occidentali ad Cape Coast et ad ostium fluvii Quorra, *Vogel*!; in sylvis umbrosis prope Onitshe, *Barter*!; in insula Fernando Po, *Vogel*! *in herb. Hook.*

10. J. KIRKIANA, *T. Anders.* Caule erecto, subscabriusculo, dichotome ramoso, sulcato; foliis subsessilibus, longissime linearibus, acutis, basi attenuatis, integris, utrinque scabriusculis; floribus terminalibus, spicatis; bracteis linearibus, margine ciliatis; calycis laciniis parvis, subulatis, ciliatis; corolla extus puberula, tubo brevi, labio inferiore rotunde 3-lobato, superiore bidentato.
Hab. In collibus prope Tette ad ripas fluvii Zambesi, *Kirk*! *in herb. Hook.*
Planta herbacea, erecta. *Caulis* tetragonus. *Folia* angustissime linearia, uninervia, 3–5 unc. longa, 3–4 lin. lata. *Spicæ* pedunculatæ, 1–2 unc. longæ, confertæ. *Bracteæ* et *calyces* pilis albis glandulosis ciliati. *Corolla* vix 5 lin. longa, straminea?

11. J. FASCIATA, *E. Mey. Cat. Pl. Drèg.*—A. fasciata, *N. ab E. l. c.* p. 402.
Hab. In Africa australi, *Drège*! *in herb. Sonder.*; ad Port Natal, *Gueinzius*!

12. J. PETIOLARIS, *E. Mey. Cat. Pl. Drèg.*—A. petiolaris, *N. ab E. l. c.*
Hab. In Africa australi, *Drège*! *in herb. Sonder.*; ad Port Natal, *Gueinzius*!

13. J. BARTERI, *T. Anders.* Caule erecto, simplici, pubescente, tetragono, sulcato; foliis breviter petiolatis, lanceolatis, basi paulo attenuatis, integris, scabris; spicis ternis, terminalibus, pedunculatis, una majore centrali, duabus minoribus, a basi pedunculi majoris axillaribus; pedunculis apice incrassatis; bracteis lanceolatis, acutis, velutinis, margine breviter ciliatis; calycis laciniis subulatis, bracteis dimidio brevioribus.
Hab. Ad Onitshe prope ripas fluvii Quorra, *Barter*!
Planta herbacea, 3–4-pedalis. *Caulis* sulcatus. *Folia* 3–4 unc. longa, 1–1¼ unc. lata, subtus venosa, subglauca. *Spica* major 1½ unc. longa, pedunculo breviore. *Calycis* laciniæ non ciliatæ. *Corolla* extus villosa, cinerea, lineis notata; tubo brevi.

14. J. DEPAUPERATA, *T. Anders.* Caule subtereti, striato; foliis subsessilibus, lanceolatis, acuminatis, obsolete dentatis, supra scabris, subtus hirsutis; spicis terminalibus, longe pedunculatis, elongatis, basi laxis; bracteis lineari-lanceolatis, acutis, glabris, margine ciliatis.

Hab. Ad Onitshe in Africa occidentali tropica, *Barter*!

Herba debilis, 3-pedalis. *Caulis* pilis patentibus hirsutis inter nodos, elongatus. *Folia* remota, acute lanceolata, 1½–2 unc. longa. *Spicæ* 2–4 unc. longæ, pedunculum æquantes. *Corolla* pallide flava, *fide Barter.*

15. J. PROCUMBENS, *Linn. Fl. Zeyl.* p. 19.—Rostellularia procumbens, *N. ab E. l. c.* p. 371.—R. rotundifolia, *N. ab E. l. c.* p. 370.—R. Abyssinica, *Brongn. et N. ab E. l. c.* p. 372.—R. mollissima, *N. ab E. l. c.* p. 373.—R. crinita, *N. ab E. l. c.*—R. Royeniana, *N. ab E. l. c.*—R. simplex, *Wight, Icon.* t. 1542, *et forsan* R. glandulosa, *N. ab E. l. c.* p. 373.

Hab. In Abyssinia ad margines montis Scholoda, *Schimper*, n. 21!, atque in montibus umbrosis prope Axum, *in herb. Hook.*!

Distr. India orientalis, insul. Philipp.!, Java!, insula Timor et Nova Hollandia tropica!

16. J. TENELLA, *T. Anders.*—Rostellularia tenella *et* R. crenulata, *N. ab E. l. c.* p. 369.—R. parviflora, *Benth. Fl. Nigrit.* p. 481.

Hab. In Senegambia, n. 327! *in herb. Hook.*; ex insula St. Thomas, *Don*!; Princes Island in locis cultis, *Barter*!; in Provincia Emirna insulæ Madagascar, *Bojer*!, *Lyall*!

17. J. TRIFOLIOIDES, *T. Anders.*—Rostellularia reptans, *N. ab E. l. c.* p. 368.

Hab. In insulis Madagascar et Pemba, *Bojer*!

18. J. HAPLOSTACHYA, *T. Anders.*—Rostellularia haplostachya, *N. ab E. l. c.* p. 369.

Hab. In insula Madagascar, *Bojer*!

†† *Floribus axillaribus, sessilibus, solitariis, geminis vel ternis.*

19. J. NEGLECTA, *T. Anders.*—Adhatoda Rostellaria, *N. ab E. l. c.* p. 397, *cum syn. sed excl. var. β. cum syn.*

Hab. In Abyssinia, in dumetis parvis prope Adoam, *Schimper*, n. 106! *Plowden*!; ad Nupe prope fluvium Quorra, *Barter*!; Abeokuta, *Irving*!; ad fluvium Gambia, *Skues*!

The variety of this species, *β. humilis*, N. ab E. l. c., is a new species of *Asystasia*—*A. Schimperi*, mihi.

20. J. INSULARIS, *T. Anders.*—Adhatoda diffusa, *Benth. Fl. Nigrit.* p. 483.

Hab. In insula Fernando Po, *Vogel*!, *Mann*!

21. J. TUBULOSA, *E. Mey. Cat. Pl. Drèg.*—Adhatoda tubulosa, *N. ab E. l. c.* p. 392, *cum syn.*—A. leptantha, *N. ab E. l. c.* p. 390, *cum syn.*

Hab. In Africa australi, *Drège*! *in herb. Hook. et herb. Sonder.; Ecklon et Zeyher*! *in herb. Sonder.*

22. J. PROTRACTA, *T. Anders.*—Adhatoda protracta, *N. ab E. l. c.* p. 390, *cum syn.* (sed forsan excl. *J. Capense*, Thunb.); var. β. microphylla, *N. ab E.*

Hab. In Africa australi ad Uitenhage, *Ecklon et Zeyher*! *Bowie*! *in herb. Hook.*; ad Port Natal, *Krauss*!, *Gueinzius*; ad Howeson's Point, *in herb. Sonder.*! Var. β. ad Port Natal, *Grant*!; ad Albany atque in regione "Ceded Territory" dicta, *Ecklon et Zeyher*! *in herb. Sonder.*

23. J. CAPENSIS, *Thunb. Fl. Cap.* p. 478.—Adhatoda Capensis, *N. ab E. l. c.* p. 391, *cum syn.*

Hab. In Africa australi ad fluvium Zwartkop et ad Albany, *Ecklon et Zeyher*! *in herb. Sonder.*

24. J. ROTUNDIFOLIA, *E. Mey. Cat. Pl. Drèg.*—Adhatoda rotundifolia, *N. ab E. l. c.* p. 391.

Hab. In Africa australi, *Drège*! *in herb. Hook. et Sonder.*

25. J. HETEROCARPA, *T. Anders.* Erecta, caule tetragono, striato, hirsuto; foliis longe petiolatis, ovato-lanceolatis, hirtellis, subtus glaucis, margine integris; floribus minutis, axillaribus, sessilibus, bracteis parvis, subulatis, ciliatis; calycis laciniis subulatis, margine ciliatis; corolla calyce dimidio longiore, tenerrima; capsulis dimorphis, normali parva, compressa, glabra, tetrasperma, valvis dorso sulcatis, abnormali ovata, paulo compressa, indehiscente, 3–4-alatis, alis serrato-dentatis.

Hab. In rupibus umbrosis prope Tazeroo, oppidum Abyssiniæ, ad altitudinem 4000 ped., *Schimp.*! n. 2300.

Distr. In Scinde!

Herba 6–3-uncialis. *Caulis* debilis, adscendens. *Semina* capsulæ normalis compressa, capsulæ cristatæ ovate subglobosa. Species ob capsulas dimorphas aliis speciebus generis distinctissima.

Sect. 3. GENDARUSSA. *Floribus paucis, axillaribus, pedunculatis vel solitariis bracteis minutis. Frutices vel plantæ lignosæ.*

26. J. HYSSOPIFOLIA, *Linn.*—Adhatoda hyssopifolia, *N. ab E. l. c.* p. 392.

Hab. In insula Teneriffæ, *Webb*! insulis Canariis, *Bourgeau*!

27. J. CUNEATA, *Vahl, En. Pl.* i. p. 163.—Adhatoda cuneata, *N. ab E. l. c. cum syn.*—A. hyssopifolia, var. β. longibracteata, *N. ab E. l. c.*

Hab. In Africa australi, *Drège*! *in herb. Hook.*; ad fluvium Zwartkop prope Uitenhage, *Ecklon et Zeyher*!; in solo indurato collium apricorum ad fluvium Zondag, *Bowie*! *in herb. Hook.*

28. J. INCANA, *T. Anders.*—Adhatoda incana, *N. ab E. l. c.* p. 393, *cum syn.*
Hab. In Africa australi ad fluvium Bruck, *Burke* ! *in herb. Hook.*

29. J. PATULA, *Lichtenst. in Roem. et Sch. Syst.* i. p. 164.—Adhatoda patula, *N. ab E. l. c.* p. 393.—A. pygmæa, *N. ab E. l. c.* p. 394.—A. diosmophylla, *N. ab E. l. c. cum syn.*
Hab. In Africa australi, *Drège* ! *in herb. Hook.*; in fruticetis siccis in districtu Albany, *Bowie* !; ad fluvium Zwartkop, prope Uitenhage, *Ecklon et Zeyher* !

30. J. ORCHIDOIDES, *Linn. fil. Suppl.* p. 85.—Adhatoda orchidoides, *N. ab E. l. c.* p. 393, *cum syn.*, Gendarussa Linaria *excl.*
Hab. In Africa australi ad Kamaquas, *Ecklon et Zeyher* ! *in herb. Drège.*

31. J. LINARIA, *T. Anders.*—Gendarussa Linaria, *N. ab E. in herb. Ecklon.*
Hab. In Africa australi, *Drège* !; ad Olifentsriver, *Ecklon et Zeyher* ! *in herb. Sond.*

32. J. ANAGALLOIDES, *T. Anders.*—Adhatoda anagalloides, *N. ab E. l. c.* p. 403.—A. patula, *N. ab E.* partim, *in herb. Sond.*
Hab. In Africa australi ad fluvium Aapges, *Burke* !; ad Somerset, *Bowker* !; ad Uitenhage et Kamoo, *Ecklon et Zeyher* !

33. J. ODORA, *Vahl, En. Pl.* i. p. 164.—Adhatoda odora, *N. ab E. l. c.* p. 399, *cum syn.*
Hab. In montanis siccis prope "Mawer" pagum Abyssinicum, *Schimper*, n. 2135 !
Distr. In Arabia felici !

34. J. ATHERSTONEI, *T. Anders.* Caule erecto, tereti, glanduloso-pubescente, ramis oppositis; foliis subsessilibus, oblanceolatis, apice acutis, integris, coriaceis, utrinque scabriusculo-glandulosis; floribus alternis, axillaribus, superioribus interdum oppositis, solitariis; bracteis parvis, lanceolatis; calycis laciniis lineari-lanceolatis, glandulosis; corolla calyce triplo longiore, tubo infundibuliformi; antheris loculo inferiore caudato; capsula apice subglobosa, abortu disperma.
Hab. In Namaqualand locis arenosis prope fluvium "An Aap River" dictum, tributarium fluminis "Orange River," *Atherstone* ! *in herb. Trin. Coll. Dubl.*

35. J. MOLLIS, *E. Mey. Cat. Pl. Drèg.*—Adhatoda mollissima, *N. ab E. l. c.* p. 391.
Hab. In Africa australi, *Drège* !; ad Natovel, *Ecklon et Zeyher* ! *in herb. Sond.*

36. J. DIVARICATA, *Willd. in herb. propr. et h. gen. Berol.* fol. 2 *et* 3. —Adhatoda divaricata, *N. ab E. l. c.* p. 391.
Hab. In Winterhoeksberg monte Africæ australis, *Ecklon et Zeyher* ! *in herb. Sond.*

37. J. SPARTIOIDES, *T. Anders.* Caule tereti, glabro; ramis superioribus alternis; foliis paucissimis, linearibus, coriaceis, integris, uninerviis; floribus alternis, axillaribus, in infimis ramorum sessilibus; bracteis subulatis, calyce dimidio brevioribus; calycis laciniis anguste linearibus, glandulosis; corolla pubescente, tubo brevi, fauce inflata; antheris loculo inferiore calcarato.

Hab. In Namaqualand, *A. Wyley*! *in herb. Trin. Coll. Dubl.*

Suffrutex virgatus, diffusus, fere subaphyllus, viridescens, partibus junioribus et calycibus glandulosis. *Folia* 3–8 lin. longa, $\frac{1}{2}$–1 lin. lata. *Bractea* 1 lin. longa. *Corolla* 6–7 lin. longa. *Capsula* ignota.

38. J. SPERGULÆFOLIA, *T. Anders.* Caule subtetragono, sulcato, molliter pubescente, ramis oppositis; foliis sessilibus, linearibus, acutis, mucronulatis, basi attenuatis, glanduloso-pubescentibus; floribus axillaribus, sessilibus, solitariis, plerumque alternis; bracteis linearibus, pubescentibus, calycem paulo superantibus; calycis laciniis linearibus, acutis, corolla multo brevioribus; corolla labio inferiore oblongo, lobis ovatis, subæqualibus; capsula ovata, compressa, pubescente.

Hab. In Africa australi in Damara Land, *in herb. Trin. Coll. Dubl.*!

Planta subherbacea, velutino-pubescens. *Folia* $\frac{3}{4}$–1 unc. longa, integerrima. *Corolla* 4–5 lin. longa, extus puberula, intus glabra. *Capsula* 2 lin. longa, apice acuta, tetrasperma.

Sect. 4. MONECHMA. *Floribus in spicis axillaribus, oppositis; capsula abortu disperma.*

39. J. BLEPHAROSTEGIA, *E. Mey. Cat. Pl. Drèg.*—Monechma angustifolium, *N. ab E. l. c.* p. 412*.

Hab. In Africa australi, *Drège*! *in herb. Sond.*

40. J. DEBILIS, *Vahl, Symb. Bot.* i. p. 4.—Monechma debilis, *N. ab E. l. c.* p. 411, *cum syn.*—M. bracteatum, *Hochst., N. ab E. l. c. cum syn.*—M. affine, *Hochst. in Flora*, 1843, p. 76, *et N. ab E. l. c.*

Hab. In Abyssinia prope Gapdia, *Schimper*, n. 759!, ad pagum Kordofanum "Tejara" dictum; inter frutices in savannis, *Kotschy*, n. 261!

Distr. In Arabia felici!

I have not seen *Monechma violaceum*, N. ab E. in DC. l. c. p. 411, from Abyssinia, and considered by Nees von Esenbeck to be the same as *Justicia violacea*, Vahl, Symb. Bot. i. p. 6. If they are identical, Vahl's name must be restored.

Sect. 5. RAPHIDOSPORA. *Floribus laxe paniculatis.*

41. J. LAXA, *T. Anders.*—Adhatoda paniculata, *Benth. Fl. Nigrit.* p. 482.

Hab. In insula Fernando Po, *Vogel*! *Mann*!

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* The genus *Monechma* was constituted by Nees von Esenbeck to receive some 2-seeded species of *Justicia*. Though the capsules of these species have only 2 seeds, their ovaries contain 4 ovules; in every other character they are generically *Justiciæ*.

42. J. EXTENSA, *T. Anders.* Caule erecto, pubescente; foliis petiolatis, ovatis, acutis vel lanceolatis, integris, utrinque glabris, petiolo pubescente; paniculis terminalibus trichotome ramosis, laxis, ramis patentibus; bracteis parvis, subulatis; floribus remotis, subsecundis, alternis; calycis laciniis lanceolatis, acutis, pubescentibus; capsula pubescente, ad medium compressa, sterili, apice subglobosa, tetrasperma.

Hab. Ad Eppah in Africa occidentali tropica, *Barter*!

Suffrutex 7-pedalis. *Caulis* teres, lignosus, striatus. *Folia* 3–4 unc. longa, 1–2 unc. lata, paucinervia; petiolo 1½ unc. longo. *Paniculæ* elongatæ, laxæ, patentes, pubescentes, paucifloræ. *Calyx* 3 lin. longus. *Capsula* 1 unc. longa, adscendens.

43. J. CORDATA, *T. Anders.*—Leptostachya cordata, *N. ab E. l.c.* p. 378, *cum syn.*—Raphidospora cordata, *N. ab E. l. c.* p. 499.

Hab. In Abyssinia ad latus montium secus flumen Tacaze infra Selassaquillam, *Schimper*, n. 1250!

44. J. GLABRA, *Koenig*, var. PUBESCENS, *T. Anders.*—Raphidospora Abyssinica, *N. ab E. l. c.* p. 500, *cum syn.*

Hab. Abyssinia in arborum umbra vallis Tacaze, *Schimper*, n. 903!

Distr. In India orientali.

45. J. CAMPYLOSTEMON, *T. Anders.*—Leptostachya campylostemon, *N. ab E. l. c.* p. 378, *cum syn.*

Hab. In Africa australi, *Drège*!; ad Somerset, *Bowker*!

46. J. LEPTANTHA, *T. Anders.*—Raphidospora leptantha, *N. ab E. l. c.* p. 501.

Hab. In insula Madagascar, *Lyall*, n. 252! *in herb. Hook.*

JUSTICIÆ *incertæ sedis.*

47. J. ANSELLIANA, *T. Anders.*—Adhatoda Anselliana, *N. ab E. l. c.* p. 403.

Hab. In locis apertis ad Palmas promontorium Africæ occidentalis, *Ansell*!; ad Aboh, *Vogel*!

48. J. MANNII, *T. Anders.* Caule fruticoso, subtereti, supra nodos tumido, ramis divaricatis, lignosis; foliis ovatis, petiolatis, integris, apice acutis vel obtusis, utrinque glaberrimis, nervis paucis, crebris; floribus in spicis axillaribus? sessilibus, spicis laxis bracteis elongatis linearibus glabris; calycis laciniis bracteis brevioribus, æqualibus, ovato-lanceolatis; corolla pubescente, tubo elongato, basi angusto, limbo bilabiato, labio inferiore oblongo, fauce corrugata, segmentis ovatis, labio superiore acuto, breviter bidentato; staminibus corolla brevioribus, antherarum loculis muticis; ovario glabro, 4-ovulato.

Hab. In insula Fernando Po, *Mann*!

Frutex? glaber. *Caulis* lignosus; cortice plus minus rugoso. *Folia* 3–6 unc. longa, 1–3 lata; petiolo 1 unc. longo, superne sulcato. *Spicæ* 1 unc. longæ, laxæ, glabræ, paucifloræ. *Bracteæ* lineares, acutæ, 5 lin.

longæ, calyce duplo longiores. *Corolla* 1¼ unc. longa, extus pubescens, intus glabra, purpurea.

XXV. SCHWABEA, *Endl.*

1. S. CILIARIS, *N. ab E., DC. Prod.* xi. p. 384, *cum syn.*

Hab. In Senegambia, *Heudelot*!; Nubia, *Kotschy*!; Abyssinia, *Schimper*!

2. S. SPICIGERA, *N. ab E. l. c.*

Hab. In Senegambia, *Heudelot*, n. 167! *in herb. Hook.*

XXVI. MONOTHECIUM, *Hochst.*

1. M. GLANDULOSUM, *Hochst. in Schimp. Pl. Abyss.* n. 2274; *N. ab E., DC. Prod.* xi. p. 310, *cum syn.*—Rostellularia glandulosa, *N. ab E., DC. l. c.* p. 373.

Hab. In Abyssinia in præruptis umbrosis prope Mai Dogale, et in rupestribus herbosis monte Bellaka, alt. 6000 ped., *Schimper*, n. 617! et n. 2274!

XXVII. ECTEINANTHUS, *T. Anders.**

Calyx 5-partitus; laciniis subæqualibus, ciliatis. *Corolla* bilabiata, labio superiore bidentato, subfornicato; labio inferiore convexo, trifido, transversim rugoso. *Stamina* duo; antherarum loculis uno super alterum posito, subtransversim apice connectivo insertis, ovalibus, muticis. *Stigma* integrum, acutum. *Capsula* ovata, basi sterilis, obliqua, tetrasperma. *Semina* ovata, compressa; testa rugosa.

1. E. DIVARICATUS, *T. Anders.*—Rhytiglossa ciliata, *N. ab E., DC. Prod.* xi. p. 335, *cum syn.*

Hab. In Africa australi, ad Uitenhage et Albany, *Ecklon et Zeyher*!; ad Port Natal, *Gueinzius*!

2. E. ORIGANOIDES, *T. Anders.*—Rhytiglossa origanoides, *N. ab E. l. c.* p. 336, *cum syn.*

Hab. In Africa australi, *Zeyher*! *in herb. Hook.*

3. E. OVATUS, *T. Anders.*—Rhytiglossa ovata, *N. ab E. l. c. cum syn.*

Hab. In Africa australi, *Drège*! *in herb. Sonder.*

4. E. PROLIXUS, *T. Anders.*—Rhytiglossa prolixa, *N. ab E. l. c. cum syn.*

Hab. Ad Port Natal, *Krauss*!; in Africa australi, *Drège*!

5. E. ECKLONIANUS, *T. Anders.*—Rhytiglossa Eckloniana, *N. ab E. l. c. cum syn.*

Hab. In sylvis Olifentshoek prope Uitenhage, *Ecklon et Zeyher*!, *Sparrman*! *in herb. Sonder.*

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* I have constituted this genus from the African species of Nees von Esenbeck's genus *Rhytiglossa*, which is probably a strictly American genus. *Ecteinanthus* is intimately connected with *Justicia*, differing from it only in the shape of the anther-cells and the capsule.

XXVIII. Rungia, *N. ab E.*

1. **R. grandis,** *T. Anders.* Fruticosa, caule adscendente, subtereti, supra nodos tumido; foliis petiolatis, ovatis, acutis, integris, utrinque acuminatis; spicis terminalibus plerumque ternis, rarissime axillaribus, solitariis; bracteis ovatis, lanceolatis, vel parte herbacea lanceolata, acuta, margine membranaceo, crenato-corrugato; calycis laciniis lineari-lanceolatis, pubescentibus; corolla tubo brevi, labio inferiore breviter 3-lobo, centrali lateralibus latiore, labio superiore bidentato; capsula ovata, compressa, apice obtusa, pubescente, tetrasperma.

Hab. In Congo, *Chr. Smith*!; ad Eppah in Africa occidentali tropica, *Barter*!

Frutex 7–10-pedalis. *Caulis* cortice glabro. *Folia* magna, herbacea cum petiolo 4–8 unc. longa, 2–3 unc. lata, paucinervia. *Spicæ* 3–6 unc. longæ, bracteatæ, dense imbricatæ, pubescentes. *Bracteæ* 6 lin. longæ, 3 lin. latæ, portione herbacea lanceolata, plana, uninervia, margine membranaceo, transversim corrugato. *Bracteolæ* bracteis minores. *Corolla* alba. *Capsula* 5 lin. longa, 3 lin. lata.

2. **R.? pubinervia,** *T. Anders.* Caule erecto, fruticoso, dichotome ramoso, pubescente; foliis petiolatis, lanceolatis, acuminatis, basi attenuatis, integris, utrinque puberulis, subtus reticulato-venosis, nervis incano tomentosis; spicis axillaribus, oppositis, breviter pedunculatis; bracteis imbricatis, lanceolatis, margine membranaceo, angusto, plano, bracteolis lanceolatis, membranaceis, bracteis minoribus; calyce campanulato, ad medium bifido, lacinia superiore breviter bipartita, inferiore tripartita; staminibus inclusis; antheris bilocularibus, loculis linearibus, superiore sæpe sterili, inferiore calcarato; capsula ovata, mucronata, tetrasperma, valvis lignosis, dissepimento solubili; seminibus magnis, testa rugosula.

Hab. In Tohiradzovu monte prope fluvium Zambesi, *Kirk*!

Frutex 5-pedalis. *Caulis* lignosus, apice foliatus, supra nodos tumidus. *Folia* lanceolata, 3–7 unc. longa, 1–2 unc. lata, supra viridia, obscure nervia, subtus pallidiora, nervis pubescentibus. *Spicæ* numerosæ, laxæ, 1–2 unc. longæ. *Stylus* teres, pubescens; stigmate subulato, integro. *Capsula* 5–6 lin. longa, lignosa, glabra; valvis in dehiscentia ruptis. *Semina* subglobosa; retinaculis basi e latere compressis, apice subulatis. *Corollam* marcidam vidi.

XXIX. Anisostachya, *N. ab E.*

1. **A. Bojeri,** *N. ab E., DC. Prod.* xi. p. 368.

Hab. In insula Madagascar, *Bojer*!

2. **A. velutina,** *N. ab E. l. c.* p. 730.

Hab. In insula Madagascar, *in herb. Hook.*!

3. **A. Commersoni,** *T. Anders.* Caule lignoso, tereti, divaricato, glabro; foliis longe petiolatis, lanceolatis, vel ovato-lanceolatis, acuminatis, basi obliquis, integris, glabris; floribus in spicis axillaribus, spicis pedun-

culatis, geminis, una alteram superante foliis dimidio breviore, bracteis imbricatis, ovatis, obtusis, membranaceis; capsula parva, glabra.

Hab. In insula Joanna, *Commerson! in herb. Hook.*

Suffrutex glaber, nigrescens. *Folia* cum petiolo 3–5 unc. longa. *Spicæ* strobiliformes, glabræ; pedunculis ½–1 unc. longis, spica longioribus.

XXX. Dicliptera, *Juss.*

† *Floribus sessilibus, verticillatis.*

1. D. verticillaris, *Juss. in Mus. Ann.* ix. p. 268, *excl. syn. præter Lamarck.*—Justicia verticillaris, *Lam., sed non Linn. fil. nec Vahl.*—D. maculata, var. β. Senegambica, *N. ab E., DC. Prod.* xi. p. 485.

Hab. In insulis Capitis viridis, *Miller!*, *Darwin!*; in insulæ "Brava" arvis incultis, *Brunner! in herb. Hook.*; ad Lagos, *Barter!*

2. D. clinopodia, *N. ab E., DC. l. c.* p. 483, *cum syn.*

Hab. Ad promontorium Bon. Spei, *Drège! in herb. Hook. et Sond.*

3. D. micranthes, *N. ab E., Wall. Pl. As. rar.* iii. p. 112.—D. spinulosa, *Hochst. in Schimp. Pl. Abyss.* n. 509.—D. umbellata, *Juss. fid. Nees.*

Hab. In regno Fayzokl, *Kotschy! in herb. Hook.* n. 513; in montibus Abyssiniæ prope Dscheladscheranne, *Schimper,* n. 509!

Distr. In regionibus aridis Indiæ orientalis!

4. D. heterostegia, *N. ab E. l. c.* p. 478.

Hab. In Africa australi, *Drège*; ad Port Natal, *Gueinzius! in herb. Sonder.*

†† *Floribus pedunculatis, axillaribus.*

5. D. lævigata, *Juss. in Ann. Mus. l. c.*; *N. ab E., DC. l. c.* p. 476.

Hab. In insula Mauritii, *Bojer!*; in sylvis opacis montis Pouce, insula Mauritii, *Bouton! in herb. Hook.*

6. D. Madagascariensis, *N. ab E., DC. l. c.* p. 476.

Hab. In insula Madagascar, *Lyall! in herb. Hook.*

7. D. Capensis, *N. ab E. in Linnæa,* xv. p. 373; *DC. l. c.* p. 481.—D. propinqua, *N. ab E. l. c.*; *DC. l. c.* p. 477.

Hab. In Africa australi prope Uitenhage, *Ecklon et Zeyher! in herb. Sond.*

8. D. maculata, *N. ab E., DC. l. c.* p. 485, *cum syn. excl. var.* β. Senegambica.

Hab. In Abyssinia in præruptis rupium locis umbrosis prope Dscheladscheranne, *Schimper,* n. 701!, *Plowden! in herb. Hook.*

XXXI. Peristrophe, *N. ab E.*

1. P. bicalyculata, *N. ab E. in Wall. Pl. As. rar.* iii. p. 113; *DC. Prod.* xi. p. 496, *cum syn.*—P. Kotschyana, *N. ab E. l. c.* p. 497.

Hab. In Abyssinia ad latera montium calida prope Dscheladscheranne, *Schimper,* n. 694!; in vallibus districtus Haramat prope Geraz, *Schimper*, n. 1095!; in regno Kordofan, *Kotschy*, n. 50! *in herb. Hook.*; Senegambia, *Boteler*!; insulis Capitis viridis, *in herb. Hook.*; in Africa centrali ad urbem Kouka prope oras lacus "Tsad," *E. Vogel*!; Borgu, *Barter*!

Distr. In Arabia felici atque in India orientali vulgatissime.

2. P. CAULOPSILA, *N. ab E. l. c.* p. 498, *cum syn.*—P. cernua, *N. ab E. l. c. cum syn.*

Hab. In Africa australi, *Drège*!; in agris prope flumen Zwartkop, *Zeyher*! *in herb. Hook. et Sond.*; in districtu Uitenhage ad flumen Zemgagh, *Bowie*!, *Harvey*!, *Ecklon et Zeyher*!

3. P. NATALENSIS, *T. Anders.* Caule erecto, 5-angulari, ramis divaricatis; foliis petiolatis, ovato-lanceolatis, basi rotundatis, margine integris, utrinque tomentosis; floribus pedicellatis, bracteis parvis, subulatis, acutis; bracteolis 2, ad calycem adpressis; calycis laciniis æqualibus, lanceolatis, extus puberulis, intus glabris; corolla profunde bilabiata, labio inferiore ovato, subintegro.

Hab. Ad Port Natal, *Gueinzius*! *in herb. Hook. et Sonder.*; *Sanderson*! *in herb. Hook.*

Planta herbacea. *Caulis* angulatus, glaber, sed ad angulos subciliatus, supra nodos paulo tumidus. *Corolla* fere uncialis, extus pilis simplicibus sparse pubescens, in sicca purpurea.

XXXII. HYPOESTES, *R. Br.*

† *Floribus axillaribus, solitariis.*

1. H. UNIFLORA, *Hochst. in Schimp. Pl. Abyss.* n. 400.

Hab. Ad rupes calidas regionis inferioris in parte australi Scholoda montis Abyssinici, *Schimper*! *in herb. Hook.*

2. H. MACULOSA, *N. ab E., DC. Prod.* xi. p. 503, *cum syn.*

Hab. In insula Madagascar prope Tananarivou, *Bojer*!

3. H. HIRSUTA, *N. ab E. l. c.* p. 504.

Hab. In insula Madagascar, *in herb. Hook.*!

†† *Floribus in verticillis axillaribus.*

4. H. ARISTATA, *Soland. in Roem. et Sch. Syst.* i. p. 140; *N. ab E., DC. l. c.* p. 509, *cum syn.*

Hab. In Africa australi ad Uitenhage, *Drège*!, *Ecklon et Zeyher*!, *Forbes*!

††† *Floribus in spicis axillaribus, secundis.*

5. H. VERTICILLARIS, *Soland. in Roem. et Sch. Syst. l. c.*; *N. ab E., DC. l. c.* p. 507, *cum syn.*, *forsan excl.* H. polymorpha, *Schlecht.*—H. clinopodia, *E. Mey. Cat. Pl. Drèg.*; *N. ab E., DC. l. c.* p. 508.

Hab. Prope Uitenhage, *Drège*! *Ecklon et Zeyher*!; ad Port Natal, *Gueinzius*! *R. W. Plant*, *Grant*!; Algoa Bay, *Forbes*!; ad "Vaal River," *Burke*!—Var. *glabra*, T. Anders., ad Somerset in Africa australi, *in herb. Hook.*!

6. H. MOLLIS, *T. Anders.* Caule subtereti, velutino; foliis longe petiolatis, ovatis, utrinque acuminatis, margine integris, supra subglabris, subtus tomentosis; spicis axillaribus, secundis, pilis patentibus pubescentibus; bracteis subulatis, tomentosis; calycis laciniis acutis, ciliatis; corolla parva, pubescente; capsula calyce duplo longiore, acuta, pubescente.

Hab. In Congo, *Chr. Smith* ! *in herb. Hook.* (*olim in herb. cl. R. Brown*).

Herba erecta, molliter tomentosa. *Caulis* striatus. *Folia* 2 unc. longa, petiolum æquantia. *Spicæ* sessiles, axillares, oppositæ, et subterminales confertæ secundæ. *Calyx* 3–4 lin. longus. *Corolla* calyce duplo vel triplo longior.—Exemplum imperfectum ex herbario infelicis Chr. Smith vidi.

7. H. FORSKALEI, *R. Br. Prodr. Fl. Nov. Holl.* i. p. 474; *N. ab E.*, *DC. l. c.* p. 507, *cum syn.*

Hab. In Abyssinia in monte Scholoda prope Adoam, *Schimper*, nn. 405! et 1861!

8. H. ROTHII, *T. Anders.* Caule subtetragono, glabro; foliis petiolatis, ovatis vel lanceolato-ovatis, acutis, margine sinuatis, supra glabris, subtus glabriusculis; spicis axillaribus subterminalibusque, paucifloris, tomentosis; bracteis in tubum coalitis, supra medium liberis; bracteolis bracteis inclusis parvis, subulatis, scariosis; calycis laciniis lanceolatis.

Hab. In Abyssinia ad Anhober, *Dr. Roth* ! *in herb. Griffith* !, *Plowden* !

Planta herbacea, erecta. *Folia* 1–2 unc. longa, sæpe utrinque acuta. *Spicæ* folia subæquantes, secundæ. *Bracteæ* calyce bracteolisque multum longiores.

9. H. INSULARIS, *T. Anders.* Caule obtuse tetragono, striato, pubescente; foliis petiolatis, ovato-lanceolatis, utrinque acuminatis, supra ad nervos hirsutis, subtus pubescentibus, petiolis marginibusque ciliatis; spicis axillaribus, sessilibus, bracteis basi coalitis, lineari-lanceolatis, acutis, glabris, margine paulo ciliatis; bracteolis scariosis, subulatis, calyce dimidio brevioribus; calycis laciniis ad medium connatis, æqualibus, subulatis; corolla elongata, angusta, profunde bilabiata, extus hirsuta, intus glabra, labio inferiore ligulato, integro.

Hab. In insula Fernando Po, *Mann* ! *in herb. Hook.*

Planta herbacea, pubescens. *Caulis* pubescens, angulis subciliatis. *Folia* integra, 4–5 unc. longa, 1–2 unc. lata. *Spicæ* petiolum æquantes. *Corolla* fere uncialis, purpurea.

10. H. BARTERI, *T. Anders.* Caule subtetragono, glabriusculo, ramoso; foliis longe petiolatis, ovatis, acutis, utrinque glabris, margine integris; spicis axillaribus, ramosis, pedunculatis vel sessilibus, solitariis vel 3–4 confertis; bracteis basi coalitis, linearibus, acutis, calyce longioribus; calycis laciniis parvis, subulatis, scariosis; corolla labio inferiore obovato, 3-dentato.

Hab. Ad Eppah prope flumen Quorra, *Barter* !

Suffrutex 4-pedalis, glaber. *Caulis* erectus, sulcatus, angulis obtusis.

Folia cum petiolo 6–7 unc. longa, 1–3 unc. lata. *Spicæ* laxæ, 2–7 unc. longæ, subsecundæ, glabræ. *Corolla* extus pubescens, lilacina.

11. H. LATIFOLIA, *Hochst. in Kotschy, Pl. Nub.* n. 296; *N. ab E., DC. l. c.* p. 509.
Hab. In Senegambia, *Heudelot*! n. 992? vel 972.

12. H. TRIFLORA, *Roem. et Sch. Syst.* i. p. 88; *DC. l. c.* p. 506, *sed excl. syn.*—H. acuminata, *Hochst. in Schimp. Pl. Abyss.* n. 1985.
Hab. Ad latus boreale montis Scholoda prope Adoam, *Schimp. Pl. Abyss.* n. 1985!

13. H. LASIOSTEGIA, *N. ab E., DC. l. c.* p. 504.
Hab. In insula Madagascar, *in herb. Hook.*!

14. H. SAXICOLA, *N. ab E., DC. l. c.* p. 503.
Hab. In interiore insulæ Madagascar, *Bojer*!

†††† *Floribus spicatis, terminalibus.*

15. H. GRACILIS, *N. ab E., DC. l. c.* p. 506.
Hab. In insula Madagascar, *Lyall*! *in herb. Hook.*

16. H. FLEXIBILIS, *N. ab E., DC. l. c.* p. 505.
Hab. In insula Madagascar, *Lyall*!

17. H. SPICATA, *N. ab E., DC. l. c.* p. 504.
Hab. In dumetis ad versuras agrorum provinciæ Emirnæ Madagascar, *Bojer, Lyall*!

18. H. FASCICULARIS, *N. ab E., DC. l. c.*
Hab. In silvaticis montosis provinciæ Emirnæ Madagascar, *Bojer*! *in herb. Hook.*

19. H. OXYSTEGIA, *N. ab E., DC. l. c.* p. 505.
Hab. In insula Madagascar, *Lyall*! *in herb. Hook.*

20. H. PULCHRA, *N. ab E., DC. l. c.*
Hab. In insula Madagascar, *in herb. Hook.*!

21. H. ANISOPHYLLA, *N. ab E., DC. l. c.* p. 503.
Hab. In insula Madagascar, *in herb. Hook.*!

22. H. BOJERIANA, *N. ab E., DC. l. c.* p. 506.
Hab. In silvis umbrosis secus rivulos provinciæ Emirnæ insulæ Madagascar, *Lyall*! *in herb. Hook.*

23. H. DICLIPTEROIDES, *N. ab E., DC. l. c.* p. 510.
Hab. In insula Madagascar, *Lyall*! *in herb. Hook.*

XXXIII. RAMUSIA, *N. ab E.*

1. R. TRIDENTATA, *N. ab E., DC. Prod.* xi. p. 309, *cum syn.*
Hab. In Africa australi ad Port Natal, *Gueinzius*! *Drège in herb. Sond.*! *et Hook.*!

XXXIV. BRACHYSTEPHANUS, *N. ab E.*

1. B. **LYALLII**, *N. ab E., DC. Prod.* xi. p. 511.
Hab. In insula Madagascar, *Lyall!* 249 *in herb. Hook.*

XXXV. RHINACANTHUS, *N. ab E.*

1. R. **COMMUNIS**, *N. ab E., DC. Prod.* xi. p. 442, *cum syn.*—R. osmospermus et R. Rottlerianus, *N. ab E. l. c.* p. 443.
Hab. In insula Madagascar ex regione interiore, *Bouton!*; in insula Mauritii sed certe non spontaneus, *in herb. Hook.!*
Distr. Suffrutex in hortis regionum tropicarum Asiæ cultus; forsan in sylvis montium Neilgherriensium et Javanicorum indigenus.

2. R. **OBLONGUS**, *N. ab E. l. c.* p. 444, *cum syn.*
Hab. In Chumi monte regionis Caffrorum, *Ecklon et Zeyher!*

XXXVI. GRAPTOPHYLLUM, *N. ab E.*

1. G. **HORTENSE**, *N. ab E. in Wall. Pl. As. rar.* iii. p. 285; *DC. Prod.* xi. p. 328.
Hab. In Sierra Leone, et insula Mauritii, in hortis cultum, *Barter! in herb. Hook. ex horto botanico Mauritii!*
Distr. Patria ignota, sed per totum orbem tropicum, ob flores speciosas foliaque variegata, introducta. In insulis Amicis (an indigena?), *Harvey!*

XXXVII. HAPLANTHERA, *Hochst.*

1. H. **SPECIOSA**, *Hochst. nov. gen. pl. Afric. in Flora,* 1843, p. 71; *N. ab E., DC. Prod.* xi. p. 308.
Hab. In Abyssinia secus ripas fluvii Tacaze, *Schimper,* n. 769!, *Plowden! in herb. Hook.*

XXXVIII. RUTTYA, *Harv.*

1. R. **OVATA**, *Harv. in Loud. Journ. of Bot.* i. p. 27; *N. ab E. in DC. Prod.* xi. p. 309, *cum var. et syn.*
Hab. In Africa australi ad Port Natal, *Gueinzius! Williamson! in herb. Hook., et Harvey; Drège! in herb. Sonder.*

XXXIX. ERANTHEMUM, *Linn.*

1. E. **NIGRITIANUM**, *T. Anders.* Caule erecto, tereti, subglabro; foliis petiolatis, ovato-lanceolatis, acuminatis, margine integris, utrinque glabris; spicis terminalibus vel subaxillaribus, dichotomis, parvifloris; calycis laciniis lanceolatis, subulatis, corolla capsulaque multo brevioribus; corolla hypocraterimorpha, limbi lobis subæqualibus; staminibus subinclusis, anantheris 2 brevioribus; capsula parte sterili elongata, acuta, glabra, valvis dorso sulcatis, in semina paulo constrictis.
Hab. In insula Fernando Po, *Mann!*

Suffrutex pedalis. *Partes veteres* glabræ, *juniores* tomento ferrugineo puberulæ. *Folia* breviter petiolata, integra, glabra, 3–5 unc. longa, 1–2 unc. lata. *Spicæ* virgatæ, breviter bracteolatæ, puberulæ, 4–8 unc. longæ. *Corollæ* tubus 1 unc. longus, angustissimus. *Capsula* apice 4-sperma. *Semina* compressa, testa rugosa.

2. E. HYPOCRATERIFORME, *Roem. et Sch. Syst. Veg.* i. p. 175; *N. ab E., DC. Prod.* xi. p. 454, *cum syn.*

Hab. Ad Sierra Leone, *Vogel* ! *in herb. Hook.*

3. E. DECURRENS, *Hochst. in Kotsch. et Schimp. Pl. Abyss.*; *N. ab E. l. c.* p. 453.

Hab. In umbra arborum ad fluvium Abyssinicum Tacaze, *Schimper*, n. 773 ! *in herb. Hook.*

XL. Dicentranthera, *T. Anders.*

Corolla infundibuliformis; limbo 5-fido; lobis ovatis, æqualibus; tubo ad medium constricto. *Stamina* 4, didynama, filamentis per paria basi connatis; antheris bilocularibus, loculis ovatis, inæqualibus, basi bicalcaratis, mucronibus rigidis, uno longiore. *Stylus* teres, puberulus; stigmate apice recurvo, bidentato; lobis patentibus. *Ovarium* basi annulo crasso, crenato cinctum, 4–6-ovulatum. *Capsula* ignota.

1. D. MACROPHYLLA, *T. Anders.* Suffruticosa, caule erecto, cortice glabro; foliis petiolatis, oblongis, apice acuminatis, basi attenuatis, margine integris, paucinerviis, utrinque glabris; spicis terminalibus, solitariis, laxe multifloris; corolla infundibuliformi, tubo elongato, limbo subcampanulato, lobis æqualibus.

Hab. In montosis insulæ Fernando Po, *Mann* !

Suffrutex partibus, foliis exceptis, nigrescentibus. *Caulis* subtetragonus, glaber. *Folia* pedalia, 4 unc. lata, basi longissime attenuata; nervis 6–10. *Flores* in spicis verticillatis, bracteatis. *Spicæ* pedales, paniculatim ramosæ. *Calyx* parvus; laciniis æqualibus, sublobatis. *Corolla* $1\frac{1}{2}$–2 unc. longa, utrinque glaberrima. *Stamina* 4, didynama; antheris bilocularibus, omnibus fertilibus; loculis basi bicalcaratis.

XLI. Asystasia, *Blume.*

1. A. GANGETICA, *T. Anders. in Enum. Pl. Zeyl.* p. 235.—A. Coromandeliana, *N. ab E., DC. Prod.* xi. p. 165, *cum syn.*—A. quaterna, A. intrusa, A. Bojeriana, *N. ab E. l. c.* p. 166.—A. Comorensis, *Bojer et N. ab E. l. c.*—A. Capensis, *N. ab E. l. c. cum syn.*—A. calycina, *Benth. Fl. Nigrit.* p. 478.

Hab. In Africa tropica et insulis copiose, ad promontorium "Palmas" et "Grand Bassa," "Cape Coast," *Vogel* !; Senegambia, *Skues* !; Jebba ad fluvium Quorra, *Barter* !; Fayzokl, *Kotschy*, n. 423! *in herb. Hook.*;

ad ripas fluvii Suabo tributarii Zambesi, *Kirk*!; Port Natal, ***Plant***!, *Krauss*!, *Drège*!; Bombatooka in insula Madagascar, *Bojer*!, *Lyall*!
Distr. Per totam Asiam tropicam ab Arabia ad insulam Java.

This is a widely distributed and very variable tropical weed, whose African forms have been described under the names I have quoted above. The remainder of the synonymy will be found at p. 235 of Thwaites's 'Enumeration of Ceylon Plants.' The colour of the corolla is generally pale yellow or white, with a few light purple spots on the lower lip.

2. A. Schimperi, *T. Anders.*—Adhatoda Rostellaria, var. β. humilis, *N. ab E. l. c.* p. 397, *cum syn.*
Hab. Abyssinia in graminosis prope Goelleb, ad altitudinem 4000 ped., *Schimper*, n. 2220!, et in vallibus prope Dscheladscheranne, *Schimper*, nn. 1657! et 1659!

3. A. Vogeliana, *Benth. Fl. Nigrit.* p. 479.
Hab. Ad vias in fruticetis in insula Fernando Po, *Vogel*!, *Mann*!; ad Abeokuta in Africa tropica occidentali, *Irving*!; in sylvis prope Angiama, *Barter*!

4. A. scandens, *Hook. Bot. Mag.* t. 4449, *excl. syn.*—A. quaterna, Ruellia quaterna, *et* Henfreya scandens, *Lindl. Bot. Reg.* 1847, *sub* t. 23.
Hab. In Sierra Leone, *Don*!, *Barter*!

XLII. Mackaya, *Harv.*

1. M. bella, *Harv. Thesaur. Cap.* i. p. 8. t. 13.
Hab. Inter saxa alveo fluvii "Tongat" prope Port Natal, *Sanderson*! *in herb. Hook.*

[The following species are described as new by the late Dr. Klotzsch in the Botany of Peters's 'Reise nach Mossambique.' The work was published in 1862 at Berlin, and has not reached Dr. Anderson.

Asystasia podostachys. Zanzibar.
—— *subhastata.* Boror.
—— *floribunda.* Boror.
—— *acuminata.* Querimba.
—— *pubescens.* Mossambique and Anjoana Island.
—— *scabrida.* Mossambique.
—— *multiflora.* Zanzibar.
—— *Querimbensis.* Querimba.
Barleria rhynchocarpa. Querimba Island.
—— *Querimbensis.* Querimba Isl.
Barleria consanguinea. Rios de Sena.
—— *squarrosa.* Rios de Sena; Tette.
—— *spinulosa.* Querimba, mainland.
—— *Senensis.* Rios de Sena.
—— *capitata.* Rios de Sena.
Blepharis pungens. Tette (*vide supra*, p. 34).
—— *acanthodioides.* Rios de Sena.
Crossandra pubescens. Boror.

Crossandra puberula. Rios de Sena.
Adhatoda formosissima. Rios de Sena; Tette.
—— *striata.* Rios de Sena.
—— *Mossambicensis.* Mossambique Island.
—— ? *microphylla.* Mossambique Island.
Rhinacanthus gracilis. Goa Island.
Eranthemum Senense. Rios de Sena; Boror.
Blechum hamatum. Rios de Sena.
Dicliptera Mossambicensis. Island and mainland of Mossambique.

Herb. Kew., 19 Feb. 1863.]

On the Spiral Markings of the Flocci in the Genus *Trichia*.

By the Rev. M. J. Berkeley, M.A., F.L.S.

[Read April 17, 1862.]

A good deal of controversy has arisen respecting the real nature of the spiral markings in the genus *Trichia*, which were first observed by Schmidel and the younger Hedwig, and afterwards more exactly, on modern improvements in the microscope, by Klotzsch and Corda, who were probably, at the time they made their observations, unaware of the earlier notices. The accuracy of Corda's drawings has, however, been called in question; and mycologists, a few months back, were pretty equally divided on either side, the one regarding the threads as real spiral vessels, the other insisting that the spiral lines were due to torsion, while Mr. Currey advocated a third opinion, in which he has been followed by De Bary and Wigand, viz. that the markings were due to elevations in the threads assuming a spiral direction.

The question has again been brought immediately under my notice by some observations of Mr. Knight, sent in a letter to Dr. Hooker from New Zealand, an extract of which I shall beg to lay before the Society.

"I notice," writes Mr. Knight, "in the review of Mr. Berkeley's 'Outlines of British Fungology' in the 'Natural History Review' of January 1861, p. 8, that the reviewer states, in respect of spiral vessels, that it is true that all the species of *Trichia* contain threads, all of which bear spiral markings, but the nature of these markings is still a subject of controversy.

"That these threads are true spiral threads I cannot doubt. I should, three or four years ago, have drawn your attention to the observations I had made on the subject, had I not been under the impression that the controversy had ceased, and the spiral nature of those cells been admitted.

"I send you now a tracing of a sketch which I made several years ago. You will see that there are three distinct continuous spirals—not asperities, nor what the reviewer terms arcuate elevations of the cell-wall following a spiral direction. That there may be no doubt of the correctness of the observation, I enclose for Mr. Berkeley a few specimens of a *Trichia* collected here. I have had them some time, and they may not be so well adapted for observation as when in a living state. With a good microscope and a $\frac{1}{5}$ object-glass the spirals are brought out quite distinct, but a $\frac{1}{8}$ may be necessary to enable one to count the number of spirals.

"Previous to observation, the specimen should be placed for a few hours in cold water, and then in boiling water. A shallow eye-glass would be best to use with the $\frac{1}{5}$; otherwise, from the age of the specimen, the crossing of the threads will give the appearance of asperities. The size of the spores is at least four times too great to admit of there being a spore attached to each asperity."

Just after the receipt of Mr. Knight's communication, a very learned paper, by Herr Wigand, appeared in Pringsheim's 'Jahrbücher für wissenschaftliche Botanik' (published at the end of November 1861) on the genus *Trichia* and the nearly allied genus *Arcyria*, which differs principally from *Trichia* in the absence of spiral markings, or rather in the frequent substitution of rings instead of spirals. The memoir is accompanied by numerous and most careful figures; and while it is quite convincing as to the threads bearing a very close relation to the spiral vessels of higher plants, it shows at the same time that they cannot be considered (at least, so far as herbarium specimens show) as vessels containing a free spiral thread, or even a raised spiral thread attached to the inner walls, but rather as having an elevation of their walls from within in a spiral direction, so as to leave a groove externally between each volution of the spiral,—the hollow of the spiral itself being filled up afterwards, it should seem, by the deposition of new matter, though never in such a degree as to produce a raised spiral thread within the tube: they resemble, in fact, if I may be allowed to use the illustration, a male screw rather than a female. As a proof of the deposit being subsequent to the spiral elevations, he adduces the fact that when first formed they are colourless, and that they only become opake at a later period of development. In certain states of *Trichia furcata*, as in *Arcyria punicea*, he finds rings instead of spirals, and, in some threads of the former, rings and spirals at the same time, with the addition of bladder-like swellings or beads towards the extremities. In *Trichia abietina* the spiral branches, and after two or three volutions becomes simple again, then running in a horizontal direction so as to form imperfect rings, and then again becoming oblique, exactly after the fashion of the mixed vessels of Phænogams. Such phases, it is clear, could never be presented by any twisting of a flat thread, even where there is one spiral alone—not to mention the fact that the threads are, from their earliest growth, not flat, but cylindrical—much less where the threads themselves are branched and, at the same time, irregular in outline, as is frequently the case. Till a thin vertical slice from a thread can be obtained, it may be impossible to say, so positively as to convince all gainsayers, notwithstanding the deeper tint, whether there is really any deposit in the inside of the threads corresponding to the spiral markings, though in any case the elevations are due simply to some action *within*, which takes place in a spiral or circular direction, passing occasionally from the one into the other.

I have examined Mr. Knight's specimens, prepared precisely according to his directions, and with an object-glass of $\frac{1}{5}$ I see, clearly enough to satisfy myself, that there is a depression in the membrane of the thread between each spiral, exactly as the structure is figured by Wigand, and, indeed, previously by Mr. Currey*, though, at the same time, it seems clear to me that there is no twisting of the thread, and that the appearance could never have been brought about by mere torsion. In *Batarrea* I have seen the vessels more closely approaching the type in Phænogams; and, unless I am greatly deceived, I have on former occasions, in individuals of *Trichia* which had just passed from the milky stage, seen nearer approaches to this than any which are figured in Wigand's plates. Be this, however, as it may, whether the difference be greater or less, it is pretty certain that the spiral marking of the threads is a case rather of affinity than analogy; and we cannot entirely deny the existence of spiral vessels in fungi, though they may exhibit a somewhat different type from that to which we are accustomed. I have seen precisely the same arcuate elevation in the cells of *Sphagnum*, respecting the spiral threads of which I believe there is no doubt.

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* Quarterly Journal of Microscopical Science, vol. iii. pl. 2. fig. 4.

Journal of an Expedition to the Coast and Capital of Madagascar, in the suite of the late Mission to King Radama. By CHARLES MELLER, M.D., Medical Attendant to the Embassy. Communicated by Sir W. J. HOOKER, F.R.S. & L.S.

[Read Dec. 4, 1862.]

H.M.S. Gorgon, Port Louis, Mauritius,
Sept. 10, 1862.

MY DEAR SIR WILLIAM,—I apprised you, in a letter written from the Naval Hospital at the Cape in June last, of the circumstances that had brought me there, and of those that made me very desirous to leave it and return to the Zambesi by the 'Gorgon'; to wit, the prospect of being attached to the Embassy deputed to carry addresses and presents from our Government to King Radama. Capt. Wilson of the 'Gorgon,' as a Commissioner, offered to attach me to his party as medical attendant, so that in such capacity I might have opportunity of collecting; and Dr. Shea, of the Naval Hospital, believing that a good sea voyage would do more for the relief of the enlarged spleen and remains of fever than a protracted residence in hospital, advised that I should request a passage from Admiral Walker, with this double purpose in view. A passage was readily granted. On arriving at Mauritius we found that Sir William Stevenson had organized an embassy, of which Major-General Johnstone was to be head, and Capt. Anson, R.A. (Inspector-General of Police), and Capt. Wilson of the 'Gorgon' Joint Commissioners, Lieut. Oliver, R.A., Aide-de-camp to the General, and myself as Medical Attendant. The Bishop of Mauritius subsequently joined the party, having a special errand to accomplish. The Queen's presents had been previously despatched under charge of an officer in the Colonial Department. Arriving at Tamatave on the 13th of July, we resided for a week in some houses set apart for the Embassy, whilst preparations were made for conveying the stores, &c. During this time official visits had to be made to the Governor and other officers; and I availed myself of invitations to their country houses, for the purpose of collecting specimens, and for information. The utmost cordiality was shown on every occasion to the Embassy or individuals of it, and every facility offered for acquiring information.

Marmites being obtained, and everything in readiness for the journey, we left Tamatave on the 22nd of July. The distance between Tamatave and Antananarivo was calculated, by the Mission which went from Mauritius to congratulate the King on his accession, at 225 miles; but as none of the gentlemen walked the distance, I am afraid they computed wrongly. We took the same number of days (17) from the one place to the other; and I walked the whole distance, with the exception of the first and last five miles, over which we had to be carried for the sake of leaving and entering these towns in due form; and I came to the conclusion that it is not more than 190 miles between these places, and that Antananarivo is not more than 130 miles from the sea at that part where, after walking south from Tamatave, we turn due west to penetrate the country. The first 60 miles of the road lie along the coast, on a spit of sand separating the sea from a chain of lakes, and sometimes so narrow that the sea at high water communicates with them. The first day's march was over a sandy plain, and across commons, on the short grass of which the herds of oxen collected near Tamatave for exportation were feeding. Skirting the sea, by Tamatave, is a dense wood or copse, with a few stout trees in it, used by the natives for making their smaller canoes, and which I believe to be a species of *Inophyllum*. There is abundance of wild coffee-shrubs in it, and of two species of Brexiads. Studding the plains about Tamatave, and more especially along the sea-board, is a *Logania*, called by the natives Voantaka—the same as that found by the Zambesi and Shiré. It yields an abundance of fruit, which is consumed (less the seeds) by the natives with avidity. With it, but much less frequently met with, is a *Clusia* (?) with edible fruit, and a *Zizyphus*, called Masaon by the Portuguese of the Zambesi, and Mason by the Mauritians. It is abundant in Mauritius, by the Zambesi, in Shiré, and Rovuma. There is not much of it on our road from Tamatave, and it was not seen after leaving the sea. Ornamenting the gardens of some of the merchants at Tamatave, and forming part of the sea-board bush, are two species of *Barringtonia*—one apparently the same as that found at Mohilla and Johanna (the fruit sent home in box No. 4), specimens of which were forwarded last February. The Copal gum-tree is very abundant along the sea, and for 70 miles of our way inland, being lost after this (the last tree seen being at about 800 to 1000 feet above the sea-level). It grows to a larger size than other trees I have seen; one found by the lakes about 29 miles from Tamatave measured 28 feet in circumference, had an enormous spread, and was full of fruit. Very little gum is collected. The natives incise the bark, and fix bamboos to receive the gum: to procure india-rubber they are less careful, merely making incisions, and allowing the sap to flow into a hole at the root of the tree. The natives procure their india-rubber from a trailing and climbing plant, whose order I am unacquainted with: it has thick cordate leaves, pear-shaped and -sized fruit, native name "Vaughina." (Fruit and india-rubber sent in box No. 4.) The *Ficus elastica* is found along the sea-board route, and a *Theophrasta*; but I am not aware that the Malagasy have recourse to these. In the journey by the coast the Morads, Euphorbias, and Myrtles are well represented. Dense, spreading, Box-like trees are held in great respect by the Betsimasaraks (a tribe of the south), who resort to these and other shade-affording trees, such as Lichis and Mangos, from devotional motives; and it is common to see beneath them the sticks, rags, and bamboos which devotees leave after paying their vows to the gods. The bamboo generally contains some rum or Betsibeti (the native rum) to propitiate the deities in favor of the supplicant who has left it. Ferns decorate trees, living and dead, on this part of the road; but they are far less varied than in that part which lies through the forests, where every tree is covered with lichens and mosses, and decayed trunks are shrouded in parasitic growths. The *Asplenium* (Corne de Bœuf; I am ignorant of its specific name), a *Pteris* (?), and several forms of *Polypodium* are most common, and many more with which I am unacquainted. Of Orchids the *Angræcum sesquipedale* and *superbum* are most prominent and numerous; they grow parasitic and terrestrial, from Tamatave, along the coast-line and for 60 miles inland, being lost sight of at about the same elevation as the Copal-tree. Three smaller species of *Angræcum* are also found, one sweet-scented, with a small white-flowered spike 1 to 1¾ foot long, and one with flowers alternately yellow and white; also a species of *Vanda* and two of *Dendrobium*, noticed by Mr. Ellis and pointed out to me in districts lying away from our road.

Growing in the plains to the height of 12 to 14 feet, from Tamatave to 20 miles inland, were two species of *Daphne*—one pink and the other white-flowered, both sweet-scented. A most conspicuous thriving shrub, a wild Mulberry, is found for the same distance; and the ground is studded with the *Vinca rosea* and several Acanthads (the same seen in Mauritius), and a blue-flowered *Lobelia*, and many more of whose class or name I am ignorant. Whilst the route lies by the lakes, two kinds of *Hibiscus* are conspicuous—one yellow-flowered, the other pink. Both trees afford, in their bark, material from which fine twine is made by the natives. There is another tree of the same form (with long cordate pointed leaves), called "Lafa," from the bark of which a coarser kind of cord is made.

On the second day's journey, a wide river, the Herondro, had to be crossed, and the road lay through a wide plain studded with decaying timber and leafless withered trees. Herds of oxen, thousands in number (one owner alone having 4000), fed here; and the grass was luxuriant, though the trees were mostly dead. Bleached, leafless trees, standing sentinel-like over the fallen, were topped or studded with earth-balls, the houses of the red ant; and of the fallen timber many had these deformities on them, and the covered ways of the red ants, which exist in great force on this part of the road. There is no indication of grass firing, no dearth of water or soil; yet few of the thousands of trees here have life. (Have the ants anything to do with this?)

The *Tanghinia veneniflua*, Voan Tangan of the Malagasy (the ordeal poison-tree), grows along the coast. It was in full flower and fruit as we passed. It is one of the most beautiful trees seen in the journey, and very abundant. From one of the Christians at Antananạrivo, who went through the ordeal during the days of persecution in the late Queen's reign, I learnt the mode of its administration. The fruit was taken, bruised, and boiled whole. A fowl was boiled, and the broth set aside. Three pieces of the skin of the fowl were cut and put into the broth. A cupful of the poison was first administered, followed by another of the broth containing the three pieces of skin. If vomiting did not speedily set in, the poison soon killed; but if it did, it was kept up by constant exhibition of the broth and warm water, until the three pieces of skin were ejected. Should these obstinately remain, it was held as evidence of guilt, and another dose of the poison was administered.

Hanging from the fork of a tree by one of the lakes, I found a pendent ribbon-like fern*, the roots of which were fixed in a mass of earth and decomposed leaves collected in the hollow of the tree. Each ribbon fell to a distance of from 3 to 5 feet, then bi- or trifurcated, and from the under part sent down a spore-case, which contained in the ripe state a mass of yellow granular matter. The primary divisions fell from 1 to 3 feet more, then subdivided, and beneath each subdivision was a spore-case connected by a diverticulum. Some of these bands measured 12 feet.

Lining the beach from Tamatave to Andovorant, the point from which the road turns westward, are two species of *Pandanus* or

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* *Ophioglossum pendulum.*

Vacoa, and the Filhao tree. The Vacoa forms a thick, strong barrier against sand-drift, and is planted by the natives around villages by the sea with this intent. It forms a more complete barrier than the Hottentot Fig at the Cape.

Several species of Aloes grow in the same locality, a *Zamia* and the Brexiads before mentioned, also a Laurel-looking shrub with bunches of white berries. A *Cytisus* rising to 6 feet flourishes here, and is again met with on the red-clay hills near the capital, but not on the road between.

I have sent a specimen of the sand taken from the border of a brackish lake by the sea. It is found also inland by the rivers. It stains the hand black. It is very heavy, and full of shining particles like pulverized plumbago.

From Andovorant we leave the sea, take canoes up a lake for 8 or 10 miles to reach the first village of the ascent, and from the road being hitherto of sand it changes to fine yellow clay composing the banks of the lake, superimposed on which is a layer of loam, in which were growing, at the time we passed, some very good sugar-cane and *Gossypium*: there is only one species of cotton in the south; it is coarse, and of short staple. On either side of the lake are rising hills, the ravines between which are filled with Bamboo and *Ravenala*, the Traveller's Tree. This tree is met with here for the first time on the road, and is the companion of the traveller for 130 miles after leaving the coast, being lost sight of after reaching an elevation of about 2500 feet. It has been thought, by some gentlemen at Mauritius who have visited Madagascar, that Mr. Ellis was mistaken when he said that some of these trees rose to 30 feet in height. During our return journey from the capital the Bishop of Mauritius and I observed several of this altitude, and one, in a ravine near Ampassimbi (a village about 2000 feet above the sea), at least 40 feet high. At the end of the lake a canal is entered, passing through paddy-fields of fine rice; and at this part the banks were covered with ferns and the Stag's-horn moss: the Arums described by Mr. Ellis are, as he says, gigantic, and line each side of the lakes and canals. Overhanging the canal were several of the *Astrapæa Wallichii* in flower; a myrtle; the "Jambrosin" (the same found at Mauritius, with the same name, fruit edible); and an *Erythrina* with heads of scarlet flowers "like bunches of French-bean flowers," 40 to 50 feet high, with a trunk 4 feet in circumference, and wide-spreading branches—native name "Asamboion." On the banks too are several brilliant *Convolvuli*, the *Mucuna pruriens*, a *Poly-*

gala used by the natives as medicine for gastric irritation, and a blue-flowered small *Solanum* the leaves of which are eaten as a vegetable by the natives, who call it "Bred." It is sold in bundles in all the marketplaces. Encircling the bushes, pendent from small trees and shrubs, is a *Lycopodium* with fringed leaves, the fringe turning black when developed into spores; the edges of the young leaves are entire. It is found from this lake to 3500 feet alt., 40 miles from the capital. A wild Raspberry spreads over acres of land near the lake, and lines the path in all moist parts of the journey till approaching the capital, and the dry red soil 40 miles south of it. Both leaves and fruit are used as medicine, bruised and mixed with rice-water, emollient and expectorant.

The canal leads to the first village on the ascent, Maromby, the land round about which is constantly moist, almost alluvial. Abundance of rice is grown. Near this village were copses of *Vangueria*, and, around it and almost every village stopped at, a *Heliconia*, with pink offshoots or sprouts near the root, which are eaten by the natives. In the canals and pools, here and elsewhere, grows a *Lotus* (*Nymphæa*) with a blue flower; the bulb is in much request by the natives, who prepare from it a kind of sago. After leaving this lake and low district, the road leads over hills, hill rising beyond hill, the land mammillated with them; and truly the cattle seem grazing on a thousand hills. The ravines are filled with the Traveller's Tree, Bananas, and the Rofia Palm (*Sagus Ruffia*). The soil at the bottom of these ravines is very rich, and the vegetation most luxuriant—differing much from that at the highest elevation reached, where, from rockiness of the soil and absence of water, scarcely a plant thrives, and artificial aids are had recourse to, to enable the natives to grow their rice. As we ascend the country, the Rofia grows more abundantly, and the Ravenala less. The sides of valleys, and ultimately the crests of hills, become clothed with dense bush of a Composite tree with orange flowers, and two forms of *Arbutus* (?), both common at the Cape. The rivers crossed for the first 40 miles from the sea had fine-sandy bottoms, subsequently quartz and sand, and quartz and débris of sandstone.

Studding the hills, or standing out in solitary boulders, were masses of sandstone, the exposed surface blackened. The hills are well covered with a coarse grass, growing in tufts, amongst which is found an Apocyneous herb avoided by the cattle (the same as found up the Zambesi). On the second day's journey from the sea, and at about 1500 feet above it, is the village Ranumafain, and below it, running south, the river after which it is named. It is in this river (*Ranu*, water, *mafana*, hot) that the hot springs are found. As the hot current jets from the river-bottom below 2 feet of rapidly flowing spring-water, it is difficult to estimate the temperature by the thermometer. One jet is at a shallow part of the stream, and the heated water which was projected to the surface raised the thermometer at once to 160° Fahr. The foot or hand placed within reach of the jet felt scalded, and was instantly and involuntarily withdrawn. I counted five springs whilst walking across the stream; they are conspicuous by the bubbling of the water from escape of gas. Hearing that former visitors had found some difficulty in procuring the hot water by a jug or bottle, I used a bamboo for the purpose, first making a small hole at one end, which was stopped till the mouth covered well the spot from which the water issued; and I obtained, I believe, a good sample of it. The water had a faint smell, slight alkaline reaction, and insipid taste; a dollar, previously brightened on the sand, being dropped into the bamboo, was found completely blackened on examination two days subsequently.

From this river the country becomes more wooded, and on the third day's journey from the sea we enter the forest, after crossing many streams, and now meet with tree-ferns and several creeping ones. The road continues over tenacious yellow and red clay, studded here and there with quartz; and the river-beds are of sandstone, pebbles, and quartz. Floating in the less rapid streams were sometimes found the flowering stalks of the *Ouvirandra fenestralis*; but it was most abundant in the Ranomafain River, near the hot springs. I may mention that I collected some shells in the hot springs—a species of *Melania*: some were alive, but most dead, probably boiled. In the streams by the coast I saw small specimens of *Pistia stratiotes*, but not after leaving the coast. The Arums continue, and line the river-banks of this part of the country. Conspicuous on the banks of some of the rivers, and seen in many marshes, was a *Crinum* with large white flowers, sweet-scented: native name Kingass. That part of the country in which the woods first passed through are situated has the most prolific vegetation. There is a redundance of lichens, mosses, and ferns—all the older and larger trees being covered with all three. One lichen in particular abounds in every wood, and hangs from most of the larger trees; it resembles the *Roccella fuciformis* of the Zambesi and East Africa. From these woods is obtained some of the timber used in house-building, and brought down to

Tamatave for exportation. Small ebony is found here; but it is from woods more to the north-westward that the best supplies of ebony, teak, and other woods are obtained.

In the shady and moist parts of the woods I found several plants with variegated leaves—a *Coleus* with bright pink markings along the midrib and veins, and a *Sonerila* with silvery intra-marginal markings, another with white spots in row, another with pink dottings and lines. There were four herbs in these woods with beautiful leaves of variegated tints, looking like "sports."

A fine *Calanthe*, with a spike as long as the finest *Angræcum*, is found in the woods north-east of Tamatave.

Having passed the thickest of the woods, a long stretch of hills follows. The soil is still of yellow clay, in many parts bearing evidence of containing iron; it is studded with masses of black basaltic rock. On one of these hills a view is obtained of the sea, distant some 30 miles. It is called "the weeping-place of the Hovas," because in times past, when slaves or offenders were brought down from the capital to be sold at the coast for exportation, it was from the summit of this hill that they saw the sea for the first time, and their native land for the last, the Hova country proper ceasing about 70 miles south of the capital.

The Rofia Palm continues in great abundance; and the hill-sides are covered with Citron-trees and the Composite bush before mentioned.

On the seventh day after leaving the coast we reached high table-land—a plain about 8 miles broad, said to extend in a north-west direction between 30 and 40 miles; it is bounded on the west by a ridge of mountains running north and south. There are several marshes and little lakes in the hollows, and much wild fowl. The grass is abundant, but coarse. Having passed the plain, the largest river crossed during the journey is met with: this is the Mangoro, about 90 yards wide, with a current equal to about two knots. Thirty miles below the part we crossed, it forms fine cataracts. It flows into the sea about 150 miles south of Tamatave. After crossing the river, more hills have to be ascended, the surface of which is composed of yellow clay; but a landslip near the river exposed three strata below this,—1st, a red clay, mixed with shining particles of what appeared like sedimentary sandstone; 2ndly, beneath this a red earth like lateritious detritus; and 3rdly, below these, and penetrating through them, lava-like honeycombed masses.

On these hills the Heath first seen near the sea is again met with, and for five or six miles nothing else is seen. But at the close of the day's journey we passed through a fine valley, well watered, with numerous villages and a large Hova population. There is now a decided change in the character of the country, houses, and people. In place of the undulating small hills, there is a single range of huge mountains. The houses, hitherto with but a single room, have now several, and are two-storied and built of planking, with sides of a composition (baked clay, &c.), and thatched with papyrus; whilst those previously passed have been either of rofia for sides and roof, or of split bamboo for the sides and a grass or rofia covering. This style of house continues to the capital. The clay used in some places is of a bluish colour. The inhabitants are all Hova, with their long black hair, ample lamba, and taciturn disposition and love of money.

Leaving them, there are but 40 miles to be passed to reach the capital; and the nearer it is approached, the less is the vegetation. The road at first lies through woods, with small timber; but after leaving these, it is over rugged hills of stiff red and yellow clay, protruding through which are massive boulders of granite. The largest village passed is almost built on the slabs of granite that pave the hill. The ravines are no longer filled with Rofia and shrubs, though the Rofia continues, and is found in gardens near the capital. Every available piece of good soil at the bottom of the ravines is carefully tended and manured for raising rice; and every little spring is diverted in many directions, to irrigate these little paddy-patches.

In the moist parts of the road a few shrubs are found; and the *Buddleia*, first met with on the sixth day from the sea, flourishes in profusion. A dwarf Heath clothes some of the most rugged of the rocks and hills, and a few of the ferns before met with are found in moist and secluded situations.

The hills close by the capital are perfectly bare; and there is but one conspicuous flower on which the eye can rest: this is Sunga-sunga of the natives (*Euphorbia fulgens*), of which there are two varieties, one a bright vermilion, the other bright orange. It grows from a thorny little plant, which creeps along the mud walls of the path, or those raised to enclose rice-grounds. It has an abundance of milky juice.

And this, Sir, is all my scanty knowledge of botany will allow me to say of the features of the road.

Mr. Ellis's description and sketch of the town (Antananarivo) give one no idea of its extent. It is built on the four sides of a hump-shaped hill; the houses rise tier over tier, each house enclosed in its square of mud or stone wall; and the whole town surmounted by the great white palace, and that again by the big bronze eagle and the national flag. It is difficult to estimate the population; an old resident said 70,000, others 100,000 and 150,000. It is densely populated. We found that the King's coronation was put off till the 23rd of September.

The seasons of Madagascar and the Zambesi country seem almost identical. The bad season in both is between November and March. The difference in the fever seems to be, that that of the Zambesi, from being at first a sthenic intermittent, resolves into remittent; that of the Malagasy is intermittent, with the stages irregular, and persisting in periodic return until full perspiration has been excited. The Embassy passed through the country during the healthiest time, and we had no fever; nor is there any heard of after leaving the coast, except at very marshy and naturally unhealthy situations. Antananarivo, though ill-drained, is healthy all the year round. The climate of the whole road was to all of us most bracing and invigorating. The maximum of the thermometer was 88° (at noon), and minimum 49° (between 4 and 6 A.M.), being almost the same as that observed last year (August) when I was at the Mission station at Magomero, Shiré River.

There are few diseases amongst the Malagasy. Small-pox is common, but seldom destroys, insomuch that the people refuse to be vaccinated, having little fear of it. There are several skin-diseases. Eczema and impetigo are very common. I saw a few cases of lepra, and two of elephantiasis. The skin-diseases are very bad. There is only one medicine used for them—the Menerara; and it seems to do good in some cases, especially the ulcerated. I think some forms of skin-diseases must be mistaken for syphilitic eruption, as I found far less evidence of the universal existence of this disease than I was led to suppose, though some of the cases seen were frightful; but then it must be recollected they have no remedies to check its ravages.

Believe me to be very faithfully yours,

CHARLES MELLER.

On a presumed case of Parthenogenesis in a Species of *Aberia*.

By T. Anderson, M.D., F.L.S., Officiating Superintendent of the Calcutta Botanic Gardens.

[Read January 15, 1863.]

Two thorny bushes, supposed to be the Kei Apple of South Africa, and provisionally referred to *Diospyros*, have been for some years in the Botanic Gardens, Calcutta, without producing flowers. A few months after I received charge of the Botanic Gardens, in March 1861, the largest plant bore a large crop of well-ripened fruits, though only pistilliferous flowers could be detected at the time of flowering, the species being diœcious. The seeds obtained from these fruits were sown, and there is now a vigorous stock of young plants. In February 1862 the same plant flowered; and from the opening of the first flower-bud until the last withered flower dropped off, not a day passed without a careful examination being made by me for the traces of a stamen in the flowers, but without finding one. The plant continued in flower for nearly a month, but produced only pistilliferous flowers. Many of the ovaries became enlarged to the size of peas, and a corresponding increase took place in the ovules; but all ultimately fell off the tree. This tree was unfortunately destroyed a few months ago, in a very severe gale. The second specimen has not yet flowered; it was artificially propagated from the original plant, now lost, and is therefore pistilliferous. Before I saw the flowers, I despatched specimens of the fruit to Sir W. Hooker for the Museum at Kew. Dr. Hooker recognized the fruit as belonging to Hochstetter's genus *Aberia*; and my examination of the flowers confirms this identification*. The plant does not occur in Harvey & Sonder's 'Flora Capensis,' though these botanists describe two species of *Aberia* from South Africa†. I can find no account, among the records in my possession, of the introduction of the plant into the

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* That portion of the generic description referring to the number of the styles and the cells of the ovary must be altered to include this species. The number of styles in the other species is 2–3, and of the cells of the ovary 1–3, but usually 2. In *Aberia edulis* both the styles and the cells of the ovary are from 6–8 in number.

† [This species is described, in the Addenda to the 2nd volume of the 'Flora Capensis,' as *A. Caffra*.—J. D. H.]

Calcutta Botanic Gardens. I have added a description of the plant.

Aberia Caffra, *Hook. f. & Harv. in Fl. Cap.* ii. *Addend.* 584. Fruticosa, ramis strictis, spinis rigidis patentibus armatis, spinis longissimis, acutis; foliis petiolatis, ovatis, ovato-oblongis, basi attenuatis, apice obtusis, emarginatis, margine integris, glabris, coriaceis, paucinerviis; floribus fœmineis solitariis, pedunculatis, in ramulis abbreviatis 4–5 confertis; calyce 5–8-partito, plerumque 7-partito, persistente, petalis et staminibus nullis; ovario globoso, glabro, 6- vel 7-locularis, rare 8-locularis; stylis 6–8, divergentibus, minute puberulis; fructu globoso, glabro, carnoso, seminibus ovatis, compressis.

Hab. In horto botanico Calcuttensi, ex Africa australi, culta.

Frutex 15-20-pedalis. *Cortex* cinereus, glaber. *Rami* striati, spinosi. *Spinæ* axillares, patentes, rigidæ, $1\frac{1}{2}$–3 unc. longæ. *Folia* in virgis, alterna, in ramis veteribus fasciculatis, 1–2 unc. longa, $\frac{1}{2}$–$1\frac{1}{4}$ unc. lata, petiolo $\frac{1}{4}$–$\frac{1}{2}$ unc. longo. *Flores masculi* ignoti; *fœminei* glabri, pallide virides, parvi, pedunculo glabro, fere $\frac{1}{2}$ unc. longo. *Fructus* pomum parvum in magnitudine æquans, basi calyce persistente cinctus; cortice flavo; succo flavo, sublacteo, in usu grato.

On a new *Heliconia* with the habits of a *Musa*, sent from New Granada by Dr. A. Anthoine to the Royal Gardens, Kew. By J. D. Hooker, M.D., F.R.S. & L.S.

[Read January 15, 1863.]

This very remarkable plant was first brought under my notice by P. Le Neve Foster, Esq., Secretary of the Society of Arts, who received a sketch of it from Dr. Anthoine of Carthagena, with some account of the fibre its peduncles produce. Mr. Foster put me in communication with Dr. Anthoine, who exerted himself at once in procuring dried specimens and seeds for the Royal Gardens of Kew. The former consist of three perfect spikes, and some flowers dried for examination, which, with his sketch and notes, have enabled me to draw up the following description:—

The habit, size, and general appearance of this noble plant are those of a *Musa*, the trunk, which attains 12–16 feet in height, being formed by the vaginæ of the leaves. The peduncles project far beyond the leaves, and, curving downwards, bear a large, narrow, flattened spike, $2\frac{1}{2}$ feet long, something resembling the tail-rattle of the rattlesnake on a gigantic scale. The structure of the flower and fruit accords perfectly with that of other *Heliconiæ*, but these organs are almost concealed by the spathe and bracts. Its nearest known ally is probably *H. rostrata*, Ruiz and Pavon, a native of Peru. Dr. Anthoine desires that this noble plant should bear the name of the Empress of Russia, which I have therefore attached to it.

Heliconia Mariæ, *Hook. f.* Foliorum vaginis truncum elatum efformantibus, lamina oblonga petiolata ampla, spicis longe pedunculatis pendulis, spathis crebre dense disticho-imbricatis rachin omnino velantibus late ovato-cymbiformibus recurvis obtusis, floribus bracteis inclusis glabratis.

Hab. Betami on the Sinu River (lat. 8° N.), State of Bolivar, in New Granada (*Dr. A. Anthoine*).

Truncus 3–4 metr., cum foliis 6 metr., etiam 10–15 centimetr., lævis, viridi-purpureus (*Anth.*). *Folia* oblonga v. lineari-oblonga, obtusa, 3–4 ped. longa, petiolo æquilonga, viridia. *Pedunculus* crass. digiti, curvus, glaber, siccus flexuosus, teres, intus vasibus mollibus farctus. *Spicæ* 1½ ped. longæ, 3–4 poll. latæ, lineares, obtusæ, compressæ. *Spathæ* 60–80, dense imbricatæ, reflexæ, valde concavæ, late ovato-cymbiformes, glabræ v. pubescentes, lateribus erectis, basin versus subcordatæ, marginibus undulatis, apice obtusiusculæ; infimæ rostratæ; inferiores 1–2 distantes, 4–5 unc. longæ, rachin pubescentem non tegentibus; cæteræ 2–2½ unc. longæ, rachin velantes; superiores inferiores amplectentes. *Flores* rubri (*Anth.*), in spatha singula 15–20, bracteis lineari-lanceolatis glabriusculis inclusi, receptaculo brevissimo in axilla spathæ inserti; apicibus perianthii tantum exsertis. *Bracteæ* albæ, spatha breviores, ovato-lanceolatæ, basi concavæ, exteriores vacuæ. *Pedicelli* ½″ longi, crassiusculi, villosuli, compressi. *Ovarium* trigonum. *Perianthium* 1″ long., foliolis extus subtomentosis. *Stylus* apice incurvus. *Antheræ* inclusæ. *Drupa* cærulea (*Anth.*), 3-cocca; coccis oblongis, compressis, basi antice fovea cupulæformi notatis, subrugosis, osseis, intus subrugosis. *Semen* erectum; testa membranacea, raphe annulari circumdata. *Albumen* subfarinaceum. *Embryo* axillaris, gracilis, extremitate radiculari paulo crassiore, germinatione foveam cocci perforante.

On the existence of two forms, and on their reciprocal sexual relation, in several species of the genus *Linum*. By CHARLES DARWIN, M.A., F.R.S., F.L.S., &c.

[Read February 5, 1863.]

THE crimson *Linum grandiflorum* presents two forms, occurring in about equal numbers, which differ little in structure, but greatly in function. The foliage, corolla, stamens, and pollen (examined dry, and distended with water) are alike in both forms. The difference is confined to the pistil: in the one form, which I will call "short-styled," the column formed by the united styles, and the short stigmas, together is about half the length of the whole pistil in the other and "long-styled" form. A more important distinction is, that the five stigmas in the short-styled form diverge greatly from each other and pass out between the filaments of the stamens, and thus lie within the tube of the corolla. In the long-styled form the elongated stigmas stand nearly upright, and alternate with the anthers. In this latter form the length of the stigmas varies considerably, their upper extremities projecting even a little above the anthers, or reaching up only to about their middle. Nevertheless there is never the slightest difficulty in distinguishing between the two forms; for, besides the difference in divergence, the stigmas of the short-styled form never reach even to the bases of the anthers. In the short-styled, the papillæ on the stigmatic surfaces are shorter, darker-coloured, and more crowded together than in the long-styled form: but these differences seem due merely to the shortening of the stigma; for in the varieties of the long-styled form with shorter stigmas, the papillæ are more crowded and darker-coloured than in those with the longer stigmas. Considering the slight and variable differences between the two forms of this *Linum*, it is not surprising that they have been hitherto overlooked.

In 1861 I had eleven plants growing in my garden, eight of which were long-styled, and only three short-styled. Two very fine long-styled plants grew in a bed a hundred yards off, and separated from the others by a screen of evergreens. I marked twelve flowers, and put on their stigmas a little pollen from the short-styled plants. The pollen of the two forms is, as stated, identical in appearance; the stigmas of the long-styled flowers were already thickly covered with their own pollen—so thickly that I could not find one bare stigma; and it was late in the season, namely, September 15th. Altogether, to expect any result from this trial seemed almost childish. From my experiments, however, on *Primula*, which have been laid before this Society ('Journal,' vol. vi. p. 77), I had faith, and did not hesitate to make the trial, but certainly I did not anticipate the full result. The germens of these twelve flowers all swelled, and ultimately six fine capsules (the seed of which germinated this year) and two poor capsules were produced; only four capsules shanked off. These two plants produced, before and after and at the time of the trial, a vast number of flowers, but the germens of not even one swelled. All these flowers, though their stigmas were so densely covered with their own pollen, were absolutely barren.

The nine other plants, six long-styled and three short-styled, grew in the beds of the same flower-garden. Four of the long-styled produced no seed-capsules; one produced two; but the remaining long-styled plant grew so close to a short-styled plant that their branches touched, and this produced twelve capsules, but they were poor. The case was different with the short-styled plants. The plant which grew in juxtaposition with the long-styled plant produced ninety-four imperfectly fertilized capsules containing a multitude of bad seeds, with a moderate number of good seeds. The two other short-styled plants grew in a single clump, and were very small, being partly smothered by other plants; they did not stand very close to any long-styled plants, yet they yielded together nineteen capsules. These facts seem to show that the short-styled plants are far more fertile with their own pollen than the long-styled. We shall immediately see that this is the case in a slight degree. But I suspect that in this instance the difference in fertility between the two forms was in part due to a distinct cause. I repeatedly watched the flowers, and only once saw a humble-bee momentarily alight on one, and then fly away, as if it were not to its taste. If bees had visited the several plants, there cannot be a doubt that the four long-styled plants which did not produce a single capsule would have borne an abundance. But several times I saw small diptera sucking the flowers; and these insects, though not visiting the flowers with anything like the regularity of bees, would carry a little pollen from one form to the other, especially when growing close together; and the stigmas of the short-styled plants, diverging within the tube of the corolla, would be more likely than the upright stigmas of the long-styled to receive a small quantity of pollen when brought by small insects. From the much greater number of long-styled than of short-styled flowers in the garden, evidently the short-styled would be more likely to receive some pollen from the long-styled, than the long-styled from the short-styled.

In 1862 I raised thirty-four plants of this *Linum* in a hotbed; and these consisted of seventeen long-styled and seventeen short-styled forms. Seed sown later in the flower-garden yielded seventeen long-styled and twelve short-styled forms. These facts justify the statement that the two forms are produced in about equal numbers. The first thirty-four plants were kept under a net which excluded insects. I fertilized heteromorphically fourteen long-styled flowers with pollen from the short-styled, and got eleven fine seed-capsules; these contained on an average 8·6 seeds per capsule, but only 5·6 were apparently good. It may be well to state that ten seeds is the maximum possible production for a capsule, and that our climate cannot be very favourable to this North-African plant. On three occasions I fertilized homomorphically the stigmas of altogether nearly a hundred flowers (but did not separately mark them) with their own pollen, but taken from separate plants, so as to prevent any possible ill effects from close interbreeding; and many other flowers were produced, which, as before stated, would get plenty of their own individual pollen; yet from all these flowers, borne by the seventeen long-styled plants, only three capsules were produced; one of these included no seed, and the other two together gave only five good seeds. Nor do I feel at all sure that this miserable product of the two half-fertile capsules from the seventeen plants, each of which must have produced at least fifty or sixty flowers, is really the result of their fertilization by their own pollen; for I made a great mistake in keeping the two forms under the same net, with their branches often interlocking, and it is surprising that a greater number of flowers were not accidentally fertilized.

Of the short-styled flowers I fertilized heteromorphically twelve with the pollen of the long-styled (and to make sure of the result I previously castrated the majority), and obtained seven fine seed-capsules. These included an average of 7·6 seeds, but of apparently good seed only 4·3 per capsule. At three separate times I fertilized homomorphically nearly a hundred flowers with their own-form pollen, taken from separate plants; and numerous other flowers were produced, many of which must have received their own pollen. From all these flowers borne on the seventeen plants, only fifteen capsules were produced, of which only eleven contained any good seed, on an average 4·2 per capsule. As remarked in the case of the long-styled plants, some even of these capsules were perhaps the product of a little pollen accidentally fallen from the flowers of the other form. Nevertheless the short-styled plants seem to be slightly more fertile with their own pollen, in the proportion of fifteen capsules to three, than the long-styled: the real proportional excess in fertility is probably a little greater, as the short-styled flowers, when not disturbed, do not so surely receive their own pollen as do the long-styled. The greater self-fertility of the short-styled flowers was, as we have seen, also shown by the plants left to themselves, and but sparingly visited by insects, in the flower-garden in 1861, and likewise by those raised in 1862.

The absolute sterility (judging from the experiments of 1861, and which is hardly contradicted by those of 1862) of the long-styled plants with their own-form pollen led me to examine into its apparent cause; and the result is so curious that it will be worth while to give most of the experiments in detail. These experiments were tried on fresh plants, grown in pots and brought successively into the house.

First. I placed pollen from a short-styled flower on the five stigmas of a long-styled plant, and after thirty hours found them deeply penetrated by a multitude of pollen-tubes, far too numerous to be counted; the stigmas had become discoloured and twisted. I repeated this experiment on another flower, and in 18 hours found the stigmas penetrated by a multitude of long pollen-tubes. All this is what might have been expected, as this is a fertile or heteromorphic union. I likewise tried the converse experiment, and placed pollen from a long-styled flower on the stigmas of a short-styled flower, and in 24 hours found the stigmas discoloured, twisted, and penetrated by numerous pollen-tubes; and this, again, is what might have been expected, as this is a fertile or heteromorphic union.

Secondly. I placed pollen of a long-styled flower on all five stigmas of a long-styled flower on a separate plant: after 19 hours I rigorously dissected the stigmas, and found only a single pollen-grain which had emitted a very short tube. To make sure that the pollen was good, I took in this case, and in most other cases, pollen either from actually the same anther or from the same flower, and proved it to be good by placing it on the stigma of a short-styled plant, and seeing numerous pollen-tubes emitted.

Thirdly. Repeated last experiment, and placed own-form pollen on all five stigmas of a long-styled flower; and, after 19½ hours, not one single grain had emitted its tube.

Fourthly. Repeated the experiment, with the same result after 24 hours.

Fifthly. Repeated last experiment, and, after leaving pollen on for 19 hours, put an additional quantity of own-form pollen on all five stigmas. After an interval of exactly three whole days, I rigorously examined the stigmas, which, instead of being discoloured and twisted, were straight and fresh-coloured; and only one grain had emitted quite a short tube, which could be drawn out of the stigmatic tissue without being ruptured.

The following experiments are more striking:—

Sixthly. I placed own-form pollen on three of the stigmas of a long-styled flower, and pollen from a short-styled flower on the other two stigmas. After 22 hours these two stigmas were discoloured, and slightly twisted, and penetrated by the tubes of numerous pollen-grains: the other three stigmas, covered with their own-form pollen, were fresh, and all the pollen-grains were loose; but I did not dissect the whole stigma rigorously.

Seventhly. Experiment repeated in the same manner, with the same result.

Eighthly. Experiment repeated, but the stigmas were carefully examined after an interval of only 5½ hours. The two stigmas with pollen from a short-styled flower were penetrated by innumerable tubes; but these were as yet short, and the stigmas themselves were not at all discoloured. The three stigmas covered with their own-form pollen were not penetrated by a single pollen-tube.

Ninthly. Put pollen of short-styled on one stigma, and own-form pollen on the other four stigmas; after 24 hours, found the one stigma somewhat discoloured, and twisted, and penetrated by many long tubes: the other four stigmas were quite straight and fresh; but on dissecting their whole lengths I found that three pollen-grains had protruded quite short tubes into the tissue.

Tenthly. Repeated the experiment, with the same result after 24 hours, excepting that only two own-form grains had penetrated the stigmatic tissue with their tubes, to a very short depth: the one stigma, which was deeply penetrated by a multitude of tubes from the short-styled pollen, presented a conspicuous difference in comparison with the other four straight and bright pink stigmas, in being much curled, half-shrivelled, and discoloured.

I could add a few other experiments; but those now given amply suffice to show that the pollen-grains of a short-styled flower placed on the stigmas of a long-styled flower emit a multitude of tubes after an interval of from five to six hours, and penetrate the tissue ultimately to a great depth, and that after twenty-four hours the stigmas thus penetrated change colour, become twisted, and appear half-withered. On the other hand, the pollen-grains of the long-styled flowers placed on their own stigmas, after an interval of a day, or even three days, do not emit their tubes, or at most only three or four grains out of a multitude emit their tubes; and these apparently never penetrate the stigmatic tissue deeply, and the stigmas themselves do not become discoloured and twisted.

This seems to me a remarkable physiological fact. The pollen-grains of the two forms are undistinguishable under the microscope; the stigmas differ only in length, degree of divergence, and in the size, shade of colour, and approximation of their papillæ, these latter differences being variable and apparently simply due to the elongation of the stigma. Yet we plainly see that the two pollens and the two stigmas are widely dissimilar in action—the stigmas of each form being almost powerless on their own pollen, but causing, through some mysterious influence, by simple contact (for I could detect no viscid secretion), the pollen-grains of the opposite form to protrude their tubes. It may be said that the two pollens and the two stigmas by some means mutually recognize each other. Taking fertility as the criterion of distinctness, it is no exaggeration to say that the pollen of the long-styled *Linum grandiflorum* (and conversely of the other form) has been differentiated, with respect to the stigmas of all the flowers of the same form, to a degree corresponding with that of distinct species of the same genus, or even of species of distinct genera.

Linum perenne.—The dimorphism is here more conspicuous, and has been noticed by several authors. In the long-styled form the pistil is nearly twice as long as in short-styled; in the latter the stigmas are smaller and, diverging more, pass out between the filaments of the stamens. I could detect no difference in the size of the stigmatic papillæ; in the long-styled form alone the stigmatic surfaces turn round so as to face the circumference of the flower: but to this point we shall presently return. Differently from what occurs in *L. grandiflorum*, the long-styled flowers have stamens hardly more than half the length of those of the short-styled. The size of the pollen-grains is rather variable; after some doubt, I have come to the conclusion that there is no uniform difference between the pollen of the two forms. The long stamens in the short-styled form project to some height above the corolla, and, apparently from exposure to the light, the filaments are coloured blue. These longer stamens correspond in height with the lower part of the stigmas of the long-styled flowers; and the shorter stamens of the latter form correspond in the same manner in height with the shorter stigmas of the short-styled flowers.

I raised from seed twenty-six plants, which proved to be twelve long-styled and fourteen short-styled. They flowered well, but were not large plants. As I did not expect them to flower so soon, I did not transplant them, and they unfortunately grew with their branches closely interlocked. All the plants were covered by a net, excepting one of each form. First, of the long-styled flowers, twelve were homomorphically fertilized by their own-form pollen, taken in every case from a separate plant; and not one flower set a seed-capsule: twelve other flowers were heteromorphically fertilized by pollen from short-styled flowers; and they set nine pods, each including on an average seven good seeds: as before, ten seeds is the maximum possible production. Secondly, of the short-styled flowers, twelve were homomorphically fertilized by own-form pollen, and they yielded one capsule, including only three good seeds; twelve other flowers were heteromorphically fertilized by pollen of long-styled flowers, and these produced nine capsules, but one was bad; the eight good capsules contained on an average exactly eight good seeds each.

The many flowers on the eleven long-styled plants under the net, which were not fertilized, produced only three capsules (including 8, 4, and 1 good seeds); whether, owing to the interlocking of the branches, these accidentally received pollen from the other form, I will not pretend to conjecture. The single long-styled plant which was uncovered, and grew close by the uncovered short-styled plant, produced five good pods; but it was a very poor and small plant.

The flowers borne on the thirteen short-styled plants under the net, which were not fertilized, produced twelve capsules (containing 5·6 seeds on average): as some of these capsules were very fine, and five were borne on one twig, I suspect that they had been visited by some minute insect which had accidentally got under the net and had carried pollen from the other form. The one uncovered short-styled plant yielded exactly the same number of capsules, namely, twelve.

From these facts we have some evidence, as in the case of *L. grandiflorum*, that the short-styled plants are in a very slight degree more fertile with their own pollen than are the long-styled plants. And we have the clearest evidence, from the result of the forty-eight flowers artificially fertilized, that the stigmas of each form require pollen from the stamens of corresponding height produced by the opposite form.

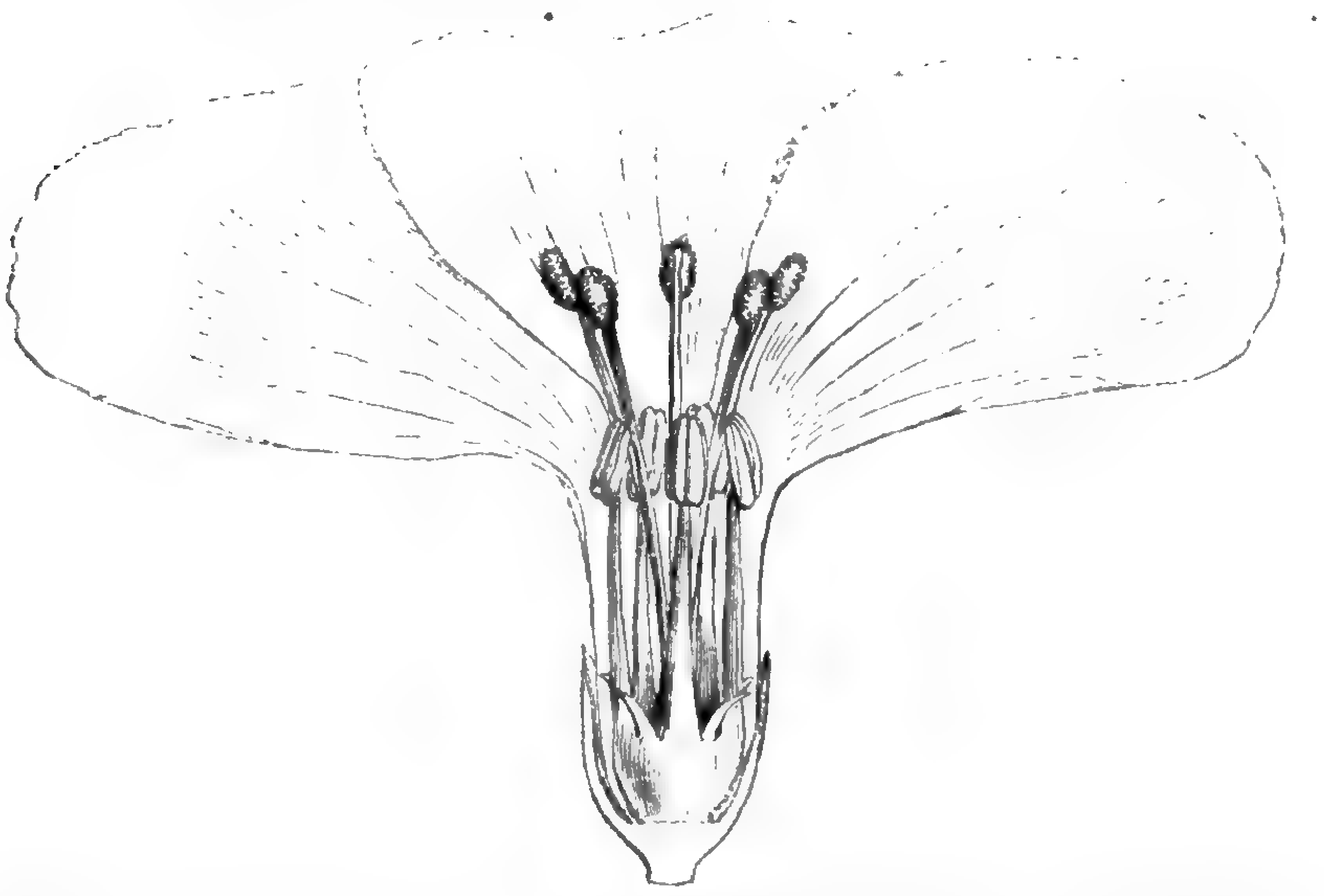
In contrast with the case of *L. grandiflorum*, it is a singular fact that the pollen-grains of both forms of *L. perenne* when placed on their own-form stigmas, though not causing fertility, yet emit their tubes; and these tubes I found, after an interval of eighteen hours, had penetrated the stigmatic tissue, but to what depth I did not ascertain. In this case the inaction of the pollen-grains on their own stigmas must be due either to the tubes not reaching the ovules, or reaching them and not efficiently acting on them. In the case of *Lythrum Salicaria*, which I hope at some future time to lay before the Society, there are three distinct forms, each of which produces two kinds of pollen; but neither pollen, when placed on its own stigma, causes fertility, except occasionally and in a very moderate degree; yet the pollen-tubes in each case freely penetrate the stigmatic tissue.

The plants of *L. perenne* and of *L. grandiflorum* grew, as stated, with their branches interlocked, and with scores of flowers of the two forms close together; they were covered by an open net, through which the wind, when high, passed; and such minute insects as *Thrips* could not, of course, be excluded; yet we have seen that the utmost possible amount of accidental fertilization on seventeen long-styled plants in the one case, and on eleven plants in the other case, was the production, in each, of three poor capsules; so that we may infer that, when the proper insects are excluded, the wind does hardly anything in the way of carrying pollen from plant to plant. I allude to this fact because botanists, in speaking of the fertilization of plants or of the production of hybrids, often refer to the wind or to insects as if the alternative were indifferent. This view, according to my experience, is entirely erroneous. When the wind is the agent in carrying pollen, either from one separated sex to the other, or from hermaphrodite to hermaphrodite (which latter case seems to be almost equally important for the ultimate welfare of the species, though occurring perhaps only at long intervals of time), we can recognize structure as manifestly adapted to the action of the wind as to that of insects when they are the carriers. We see adaptation to the wind in the incoherence of the pollen, in the inordinate quantity produced (as in the Coniferæ, Spinage, &c.), in the dangling anthers well fitted to shake out the pollen, in the absence or small size of the perianth or in the protrusion of the stigmas at the period of fertilization, in the flowers being produced before they are hidden by the leaves, in the stigmas being downy or plumose (as in the Gramineæ, Docks, and other plants) so as to secure the chance-blown grains. In plants which are fertilized by the wind, the flowers do not secrete nectar, their pollen is too incoherent to be easily collected by insects, they have not bright-coloured corollas to serve as guides, and they are not, as far as I have seen, visited by insects. When insects are the agents of fertilization (and this is incomparably the more frequent case both with plants having separated sexes and with hermaphrodites), the wind plays no part, but we see an endless number of adaptations to ensure the safe transport of the pollen by the living workers. We can recognize these adaptations most easily in irregular flowers; but they do not the less occur in perfectly regular flowers, of which those of *Linum* offer an instance, as I will almost immediately endeavour to show.

I have already alluded to the rotation of each separate stigma in the long-styled form alone of *Linum perenne*. In the other species examined by me, and in both forms when the species are dimorphic, the stigmatic surfaces face the centre of the flower, and the furrowed backs of the stigmas, to which the styles are attached, face the circumference. This is the case, in the bud, with the stigmas of the long-styled flowers of *L. perenne*. But by the time the flower in this form has expanded, the five stigmas, by the torsion of that part of the style which lies beneath the stigma, twist round and face the circumference. I should state that the five stigmas do not always perfectly turn round, two or three often facing only obliquely towards the circumference. My observations were made during October; and it is not improbable that earlier in the season the torsion would have been more perfect; for after two or three cold and wet days the movement was very incomplete. The flowers should be examined shortly after their expansion; for their duration is brief, and, as soon as they begin to wither, the styles become spirally twisted together, and the original position of the parts is lost.

He who will compare the structure of the whole flower in both forms of *L. perenne* and *grandiflorum*, and, I may add, of *L. flavum*, will, I think, entertain no doubt about the meaning of this torsion of the styles in the one form alone of *L. perenne*, as well as the meaning of the divergence of the stigmas in the short-styled forms of all three species. It is absolutely necessary, as we now know, that insects should reciprocally carry pollen from the flowers of the one form to those of the other. Insects are attracted by five drops of nectar, secreted exteriorly at the base of the stamens, so that to reach these drops they must insert their proboscides outside the ring of broad filaments, between them and the petals. In the short-styled form of the above three species, the stigmas face the axis of the flower; and had the styles retained their original upright and central position, not only would the stigmas have presented their backs to insects as they sucked the flowers, but they would have been separated from them by the ring of broad filaments, and could never have been fertilized. As it is, the styles diverge greatly and pass out between the filaments. The stigmas, being short, lie within the tube of the corolla; and their papillous faces, after the divergence of the styles, being turned upwards are necessarily brushed by every entering insect, and thus receive the required pollen.

In the long-styled form of *L. grandiflorum*, the parallel anthers and stigmas, slightly diverging from the axis of the flower, project only a little above the tube of the somewhat concave corolla; and they stand directly over the open space leading to the drops of nectar. Consequently when insects visit the flowers of either form (for the stamens in this species occupy the same position in both forms), they will get their proboscides well dusted with the coherent pollen. As soon as the insect inserts its proboscis to a little depth into the flower of the long-styled form, it will necessarily leave pollen on the faces and margins of the long stigmas; and as soon as the insect inserts its proboscis to a rather greater depth into the short-styled flowers, it will leave pollen on their upturned stigmatic surfaces. Thus the stigmas of both forms will indifferently receive the pollen of both forms; but we know that the pollen alone of the opposite form will produce any effect and cause fertilization.



Long-styled form of *L. perenne*, var. *Austriacum*, with the petals and calyx removed on the near side.

In the case of *L. perenne*, affairs are arranged a little more perfectly; for the stamens in the two forms stand at different heights, and pollen will adhere to different parts of an insect's body, and will generally be brushed off by the stigmas of corresponding height, to which stigmas each kind of pollen is adapted. In this species, the corolla is flatter, and in the one form the stigmas and in the other form the anthers stand at some height above the mouth of the corolla*. These longer stigmas and longer stamens do not diverge greatly; hence insects, especially rather small ones, will not insert their proboscides between the stigmas or between the anthers, but will strike against them, at nearly right angles, with the backs of their head or thorax. Now, in the long-styled flowers of *L. perenne,* if each stigma had not rotated on its axis, insects in visiting them would have struck their heads against the backs of the stigmas; as it is, they strike against the papillous fronts of the stigmas, and, their heads being already charged with the proper coherent pollen from the stamens of corresponding height borne by the flowers of the other form, fertilization is perfectly effected.

Thus we can understand the meaning of the torsion of the styles in the long-styled flowers alone, as well as their divergence in the short-styled flowers.

One other point is worth a passing notice. In botanical works many flowers are said to be fertilized in the bud. This rests solely, as far as I can discover, on the anthers opening in the bud; no evidence is adduced that the stigma is at this period mature, or that, if then penetrated by pollen-tubes, it is not subsequently, after the expansion of the flower, acted on by pollen brought from other flowers. In the case of *Cephalanthera grandiflora* I have shown† by experiment that insufficient precocious self-fertilization, together with subsequent full fertilization, is the regular course of events. The belief that flowers of any plant are habitually fertilized in the bud, or are perpetually self-fertilized, is a most effectual bar to really understanding their structure. I am far from wishing to say that some flowers, in certain seasons, are not fertilized in the bud: I have reason to believe that some flowers are frequently fertilized without expanding; but my observations lead me to disbelieve that this is ever the invariable course with all the flowers of any species whatever. As it is difficult to prove without troublesome experiments the falsity of the belief of regular fertilization in the bud, I here notice this subject. An estimable and laborious observer*, resting his belief on the usual kind of evidence, states that in *L. Austriacum* (which is dimorphic and is considered by Planchon as a variety of *L. perenne*) the anthers open the evening before the expansion of the flowers, and that the long-styled stigmas are then almost always fertilized. He asks whether this precocious fertilization in the several species of *Linum* and in other plants is not one cause of the short duration of their flowers. Now we know positively that, so far from *Linum perenne* being fertilized by its own pollen in the bud, its own pollen is as powerless on the stigma as so much inorganic dust.

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* I neglected to get drawings made from fresh flowers of the two forms. Mr. Fitch has made the above sketch of a long-styled flower from dried specimens and published engravings: his well-known skill ensures accuracy in the proportional size of the parts; and I believe their relative position is true.

† Fertilization of Orchids, p. 108.

Linum flavum.—To recur to our more immediate subject, in the long-styled form of this species the pistil is nearly twice as long as in the short-styled form; and the stigmas are longer with the papillæ coarser. In the short-styled form the stigmas diverge and pass out between the filaments. The stamens in the two forms differ in height, and, what is singular, the anthers of the longer stamens are shorter; so that in the short-styled form both stigmas and anthers are shorter than in the other form. The pollen of the two forms does not differ. I have not been able to try any experiments on this species; but a careful observer, Mr. W. C. Crocker, intends proving their reciprocal fertility next summer. As this plant is propagated by cuttings, I have generally found that all the plants in the same garden belong to the same form. On inquiry I have never heard of its seeding in this country; but to anyone wishing to raise seedlings, in all probability the path is now open, namely, by carrying pollen from one form to the other.

I have now shown that three species of *Linum* are dimorphic, besides several races of *L. perenne*, esteemed by some botanists to be distinct species, such as *L. montanum*, *L. Sibiricum*, and *L. Austriacum*. According to Vaucher†, *L. Gallicum*, *L. maritimum*, and *L. strictum* are in the same manner dimorphic, as likewise is, according to Planchon‡, *L. salsoloides*. This latter botanist is the only one who seems to have been struck with the importance of the subject; and he acutely asks whether this dimorphism has not some influence on the manner of fertilization. We thus know of seven dimorphic species of *Linum*; but as this structure has been overlooked in such common garden-flowers as *L. grandiflorum* and *L. flavum*, it is probably of frequent occurrence.

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* Études sur la Géograph. Bot., par Prof. H. Lecoq, 1856, tom. v. p. 325.

† Hist. Physiolog. des Plantes d'Europe, 1841, tom. i. p. 401.

‡ Hooker's London Journ. of Botany, 1848, vol. vii. p. 174.

All the species, however, are certainly not thus characterized. I have examined many specimens of *L. catharticum*, and found in all that the stamens and stigmas were of nearly equal height and the same in all the plants. So, again, I looked, near Torquay, at many flowers of the wild *L. usitatissimum* or *angustifolium* (I know not which), and there was no trace of dimorphism. Again, I raised 111 plants from seed sent me from Kew, incorrectly named *L. Austriacum*; the plants were tall and straight, having a rather different aspect from the wild species seen at Torquay, with extremely fugacious blue flowers: in all these plants the stigmas stood on a level with the anthers or projected a very little above them. I protected the flowers from insects; but every one of the 111 plants produced plenty of seed. I mention this fact because it had occurred to me that possibly a species might be dimorphic in function, though not in structure.

Lastly, *Linum Lewisii*, which is ranked by Planchon as a variety of *L. perenne*, but which, now that we know the meaning of reciprocal dimorphism, surely deserves specific honours, must not be passed over. According to Planchon*, the same plant bears some flowers with anthers and stigmas of the same height, and others with styles either longer or shorter than the stamens; so that the same individual plant is trimorphic. This, as far as I know, is a unique case. From analogy we may pretty safely predict the function of the three kinds of flowers: those with stigmas and anthers of the same height will be self-fertile; those with these organs of unequal height will require reciprocal fertilization. A plant of *L. grandiflorum* or of the other dimorphic species, growing by itself, could no more perpetuate its race than could one sex of a diœcious plant, nor could any number of plants without the aid of insects. A single plant of *Linum Lewisii*, on the other hand, in all probability could propagate itself, even if no insects were present, as probably sometimes occurs in its Arctic home. If insects visited the plant, the flowers which were dimorphic would be fertile one with another or with those on any neighbouring plant. Thus the plant would receive the advantage of a cross.

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* Hooker's London Journ. of Botany, 1848, vol. vii. p. 175. It is not improbable that the allied genus *Hugonia* is dimorphic; for (p. 525) one species is described "staminibus exsertis;" another has "stamina 5, majora, stylos longe superantia;" and another is furnished "stylis staminibus longioribus."

That this is an advantage, and is one great end gained by reciprocal dimorphism, I can entertain no doubt. That in some cases this dimorphism may be a step towards a complete separation of the sexes, I will not dispute; but good reasons could be assigned to show that there is no necessary connexion between reciprocal dimorphism and a tendency to diœcious structure. Although good is gained by the inevitable crossing of the dimorphic flowers, yet numerous other analogous facts lead me to conclude that some other quite unknown law of nature is here dimly indicated to us.

On the Form of the Vascular Fasciculi in certain British Ferns.

By ARTHUR H. CHURCH, B.A. Oxon. Communicated by W. FRANCIS, Ph.D., F.L.S.

[Read Dec. 18, 1862.]

THE distribution of the vascular tissues in the stem and stipes of the British species of Ferns has been made the subject of much interesting and accurate study by Dr. Ogilvie*. His papers are to be found in the 'Annals and Magazine of Natural History' for December 1859 and November 1860. My own long-continued examination of the living plants has not enabled me to detect any but the most trivial mistakes in these full and admirable memoirs. I have therefore only to propose a few slight alterations in Dr. Ogilvie's conclusions, and to make one or two additional remarks on certain species and varieties which he omits to notice. The present communication may be deemed the first instalment of such supplementary observations. I may also here state that I can confirm the general accuracy of Duval-Jouve's figures so far as they relate to species found in Britain.

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* The following list of papers includes nearly all those in which the vascular tissues of Ferns have been discussed :—

Presl. Tentamen Pteridographiæ. Pragæ: 1836.
Fée. Die Gefässbündel im Stipes der Farne. Pragæ: 1847.
Ogilvie, Dr. Ann. & Mag. Nat. Hist. 1859 and 1860.
Duval-Jouve, J. Etudes sur le Pétiole des Fougères. In Billot's Archives de la Flore de France; pp. 57 & 149.
King. On Sigillaria. Edinburgh Phil. Trans. 1844.
Leighton, Rev. W. A. Hints on a new character in Ferns. Phyt. n. s. i. p. 256.
Moore, T. The Vascular Bundles of the Stipes of Ferns. Phyt. n. s. i. p. 378.
Reichardt, H. W. Ueber der Gefässbündel Vertheilung im Stamme und Stipes der Farne. Denkschriften der Kaiserlichen Akademie der Wissenschaften, xvii^{ter} Band. Wien: 1859.

To discuss the difficult question of the nomenclature of these plants is beside my purpose; I shall therefore do no more than designate each form named by two or three of its best-known synonyms. At the same time, it seems that the results of such inquiries as the present, as possibly affording criteria of generic if not of specific difference, cannot be wholly disregarded, and may ultimately aid us in arriving at a more consistent classification for the Filices.

The genera *Polystichum* and *Lastrea* as understood by Moore and many other authors are respectively coextensive (so far as our native ferns are concerned) with the genera *Aspidium* and *Nephrodium* adopted by Hooker in his 'British Ferns' (1862). I have examined transverse sections of the stipes of all the generally received species and many of the varieties included under these generic appellations, and in two species only did I find any material departure from that one particular arrangement of the vascular fasciculi which is disclosed by a transverse stipital section of such a form as Moore's *Lastrea Filix-mas* or *Polystichum Lonchitis*. In *Nephrodium Filix-mas*, *N. rigidum*, *N. cristatum*, *N. spinulosum α. bipinnatum*, *β. dilatatum*, *γ. æmulum*, *δ. dumetorum*, *Aspidium aculeatum α. lobatum*, *β. intermedium*, *γ. angulare* of Hooker, and also in the forms *Lophodium glandulosum*, *L. uliginosum*, *L. nanum*, and *L. collinum* of Newman, the same disposition of the vascular tissue occurs. The two notable exceptions to which I have before alluded are found in *Nephrodium Thelypteris* and *N. Oreopteris* of Hooker, identical with the *Lastrea Thelypteris* and *L. montana* of Moore and the *Hemestheum Thelypteris* and *Lastrea* (*Hemestheum*) *montana* of Newman. In fig. 1 the prevalent arrangement is shown; in fig. 2 that which occurs in the mountain fern; while fig. 3 represents that of the marsh fern, which I will now more particularly describe. In all cases the sections noticed are those of the stipes, not of the stem; and I have freely availed myself of the use of a very weak solution of perchloride of iron, in order that the tracts containing tannin might be distinctly marked out.

Nephrodium Thelypteris, Hooker.
Hemestheum Thelypteris, Newman.
Lastrea Thelypteris, Moore.

The present plant is not only closely connected in many of its external characteristics with *N. Oreopteris*, but also greatly resembles that species in the form and arrangement of the vascular bundles of its stipes. For instance, in a fertile frond, 26 inches long, which I examined, where the stipes measured 12 inches, though the vascular tract could be clearly traced sending a branch of a greenish tint into each pinna, yet there was no sign of the prolongation of the dark sheath so conspicuous in each vascular bundle of the stipes in this fern, and which is an almost invariable element in the other British *Nephrodia* (*Lastreæ*). Now the dark sheath is not partially only, but entirely wanting in *N. Oreopteris*. Figs. 4 *a*, 4 *b*, 4 *c*, and 4 *d* represent transverse stipital sections made respectively at the junction of stem and stipes, and at 3, 6, and 9 inches above that point; figs. 4 *e* and 4 *f*, similar sections at further intervals of 1½ inch. It will be seen that the two large oval vascular bundles have coalesced at 10½ inches from the origin of the stipes, and 1½ inch below the first pair of pinnæ. At and near the origin of the stipes its cortical layer is thick, dense, and dark, as shown in 4 *a*. Above, as the dark sheaths of the fibro-vascular bundles are more marked, and their constituent cells more lignified by secondary deposits, so the cortical layer becomes paler and thinner: this observation has been made frequently with reference to other species of ferns. In figs. 1, 2, & 3, a remarkable difference in the arrangement of the scalariform ducts in the midst of the smaller cells of the fibro-vascular bundles is noticeable. These spiral-fibrous or, rather, scalariform ducts are arranged for the most part, both in *Nephrodium Thelypteris* and in the closely allied species *N. Oreopteris*, in the form of the Greek letter Σ,—the more usual form being that shown in fig. 1, which is, with slight variations, common to all the other British *Nephrodia* and *Aspidia**. Here, all the larger cells of the two main fasciculi† near the axis of the stem are grouped together in an irregular oval or pear-shaped figure, from one extremity of which an incurved prolongation proceeds†. The thickened cells of the cortical layer and of the dark sheath are of nearly equal size, and far less in transverse diameter than the general parenchyma of the stem. They are alike stained black when moistened with perchloride of iron, owing to the presence in them of tannin.

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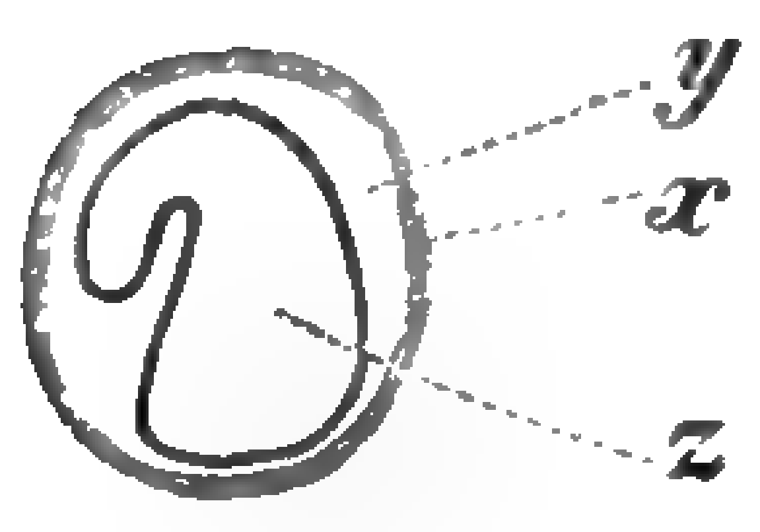
* In the genus *Lastrea*, *L. recurva* (*Fœnisecii*), with its very compound fronds of almost deltoid outline, its dark ramenta, and the trilobed outline displayed by a transverse section of its stipes, passes, by nearly insensible gradations, through *Lastrea dilatata* and its slightly divergent varieties,—through Mr. Westcombe's new form *L. Scotica*,—through the forms *L. glandulosa*, *L. spinulosa*, and *L. uliginosa*, to *L. cristata* with its simpler narrow fronds, its pale concolorous ramenta, and its quadrangular section,—the disposition of the vascular fasciculi remaining nevertheless nearly identical in the whole series.

† In the British Lastreas, &c. (excepting, of course, *L. Oreopteris* and *L. Thelypteris*), the *number* of the fasciculi, though never less than three, is by no means a constant character, sometimes as many as eleven or thirteen being found in a large and vigorous frond. Frequent branching and anastomosing of the

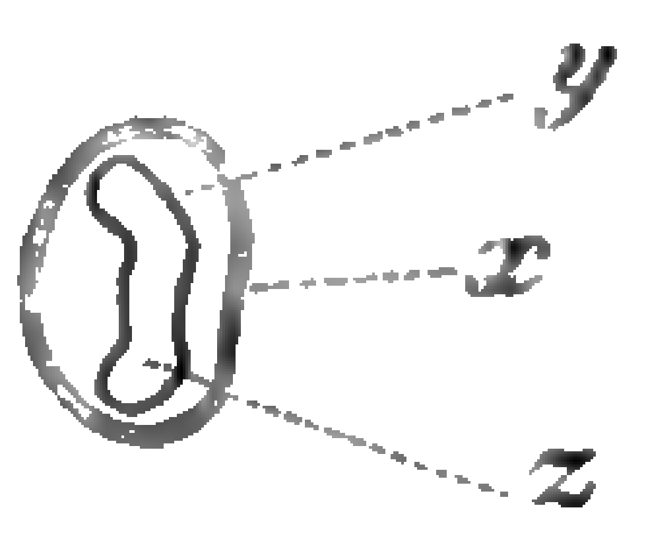
Fig. 1.



× 5.

Transverse section of one of the two larger vascular fasciculi of the stipes of *Nephrodium Filix-mas* (var. *Borreri*).

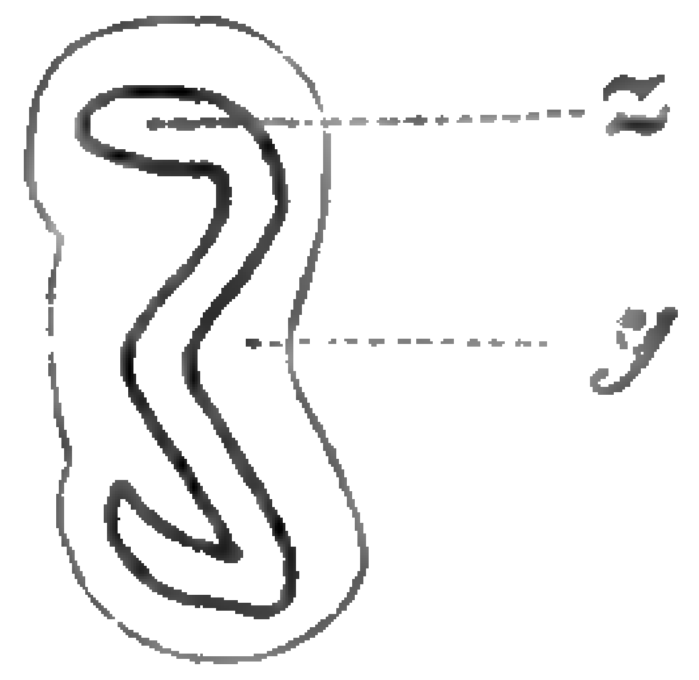
Fig. 2.



× 5.

Transverse section of one of the two fasciculi of the stipes of *N. Thelypteris*.

Fig. 3.

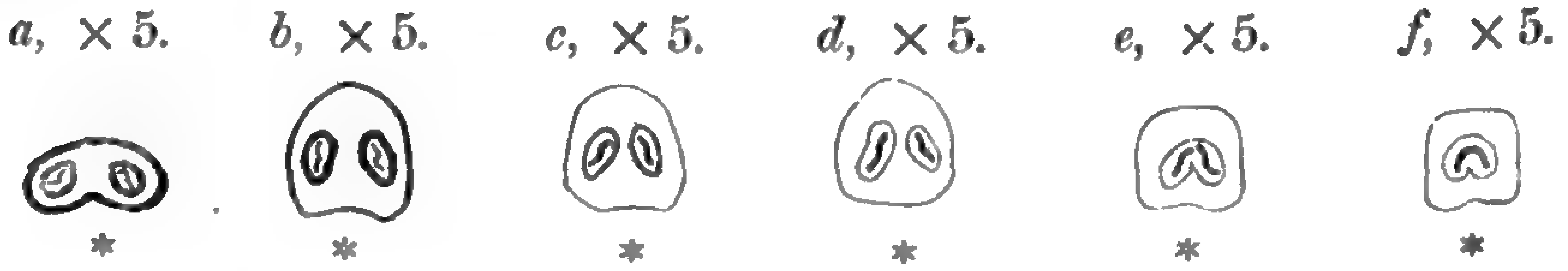


× 5.

Transverse section of one of the two fasciculi of the stipes of *N. Oreopteris*.

The perchloride of iron, as a general rule, darkens the cortical layers and the immediate envelope of the central scalariform vessels.

Fig. 4.



Nephrodium Oreopteris, Hooker.
Hemestheum montanum, Newman.
Lastrea Oreopteris, Moore.

Dr. Ogilvie states that *N. Oreopteris* has two vascular bundles in its stipes, and that there is a tract of dark tissue upon that aspect of each bundle which looks towards the axis of the stipes. I have dissected numerous large and mature specimens of this fern, but have never been able to discover a trace of dark tissue

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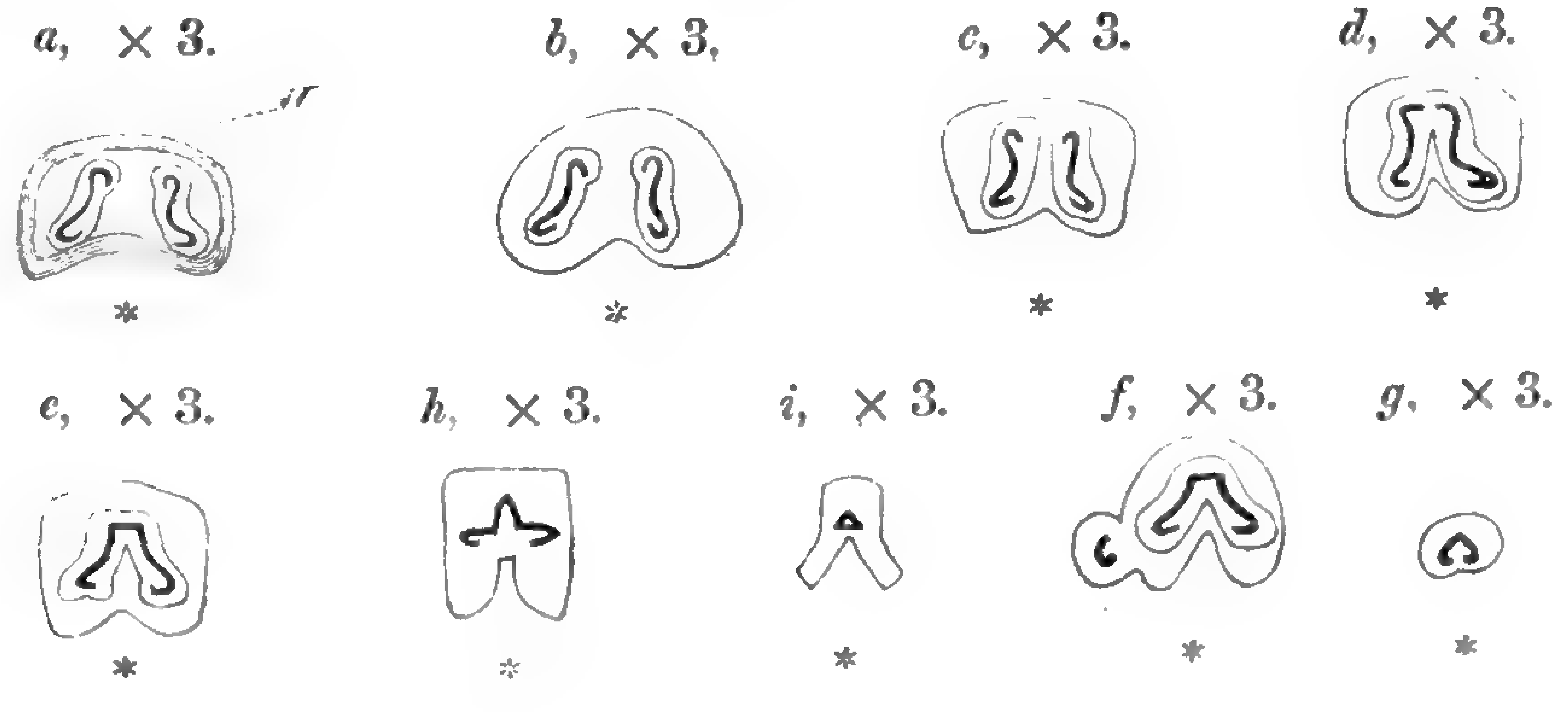
bundles in a stipes occurs, so that a section of a stipes may disclose more bundles at some part of its upper extremity than at its base, and *vice versâ*. In *Lastrea dilatata* (*Lophodium multiflorum*, Newm.) and its nearest allies, the irregularities in this respect are more pronounced than in *L. cristata* (*Loph. callipteris*).

† Throughout the figures in the present paper an asterisk indicates the axis of the stem; while the letters x, y, z refer to the dark sheath, to the small cells, and to the large scalariform vessels of the vascular bundles, respectively: the cortex, if given, is marked w.

in the interior of the stipes, though its strong cortical layer is thick and deeply coloured. The vascular bundles also differ in form very strikingly from those of allied species (excepting *N. Thelypteris*). Figs. 5 *a*, 5 *b*, and 5 *c* represent stipital sections made respectively at the junction of the stem and stipes, at midway between that point and the origin of the first pair of pinnæ, and at a short distance below the first pair. The central portion of each fasciculus has a form still more closely resembling that of the Greek Σ than does the corresponding part in *N. Thelypteris*; it is conspicuous from its whiteness, and consists mainly of large scalariform ducts. Fig. 5 *d* shows the approach of the bundles above the origin of the second pair of pinnæ, while 5 *e* shows their junction after the seventh pair. The appearance of the rachis after the twelfth pair is given in fig. 5 *h*; a leafy wing to the rachis originates after the sixteenth pair of pinnæ, and is represented in fig. 5 *i*. Figs. 5 *f* and 5 *g* illustrate the origin† and form of the vascular bundle proceeding to the eighth pinna. This partial bundle originates in precisely the same manner as the partial bundle in *Osmunda regalis* described (for the sake of elucidating this point) further on.

Fig. 5.



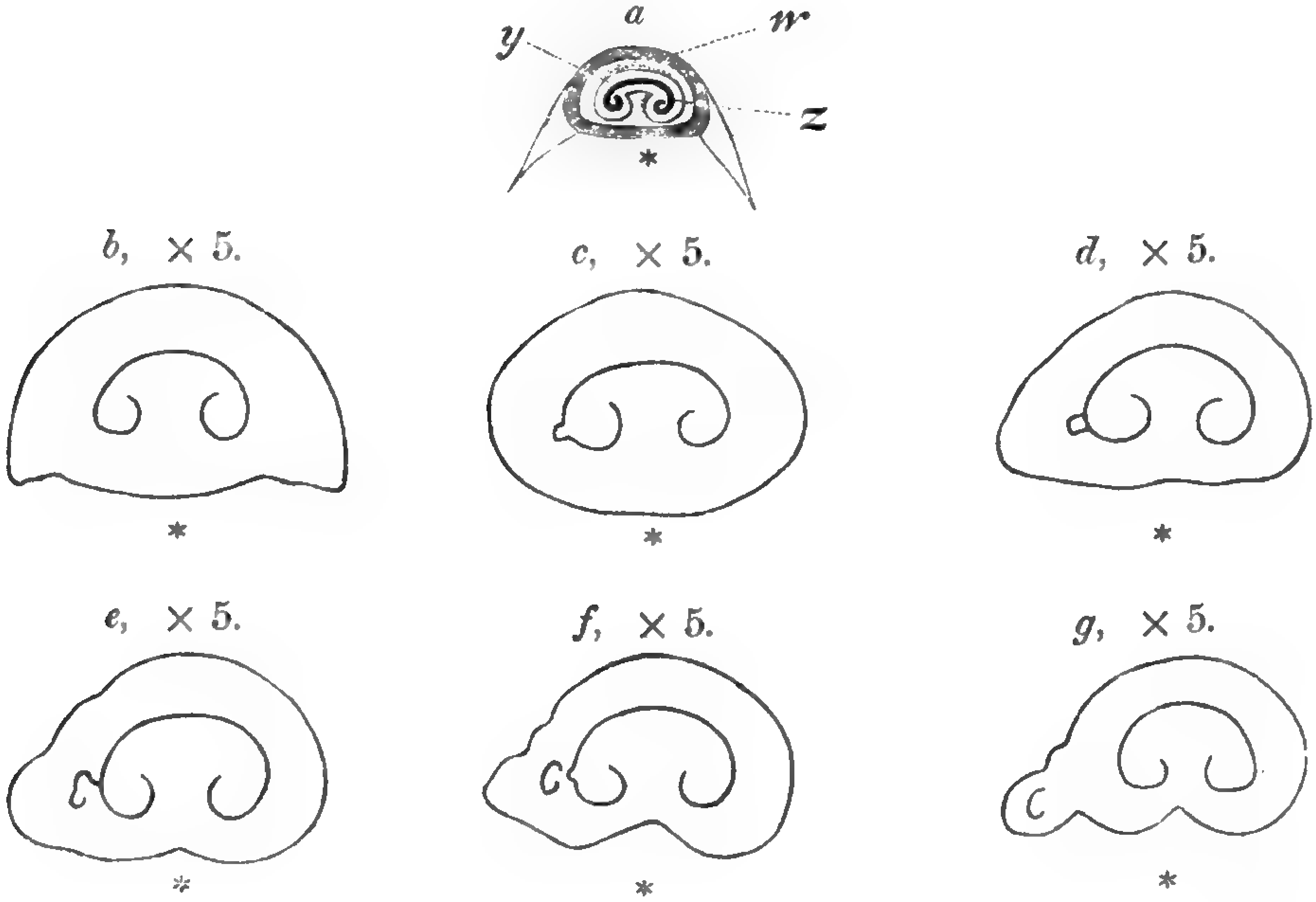
Osmunda regalis.

The disposition of the vascular tissue in the stipes of *O. regalis* is remarkably different from that of the other ferns which I have described. Dr. Ogilvie's account is accurate in the main. I will therefore here merely direct attention to a series of diagrams illustrating the structure of the stipes, &c. at different points. Fig. 6 *a* shows the stipes, of the natural size, at its insertion into the stem, and discloses on the exterior two wings of soft white cellular tissue,

† The term 'origin' is employed in reference to the actual state of the vascular cord at different parts of the stem at the same time—to its condition in space, not to its development in time.

the cortical layer, and the interior parenchymatous tract in which the vascular bundle lies. This bundle has the form of a crescent, each end of the crescent being a volute. On the *convex* side of the crescentic fasciculus, and away from the axis of the stem, a few small dark tracts may be observed, and occasionally two or three others may be detected on those aspects of the volutes which most nearly approach. [Dr. Ogilvie finds the dark tracts on the concave aspect of the fasciculus: I have never observed this.] These dark tissues are hardly to be distinguished from true woody fibre. Figs. 6 *b*, 6 *c*, 6 *d*, 6 *e*, 6 *f*, 6 *g* are diagrams intended to trace the origin of the vascular bundle which branches off to the first pinna. Not only do the various foreign forms of this plant exhibit the same disposition of the vascular tissue in the stipes, but an identical arrangement in species of *Osmunda* generally thought to be distinct, such as *O. Claytoniana*.

Fig. 6.

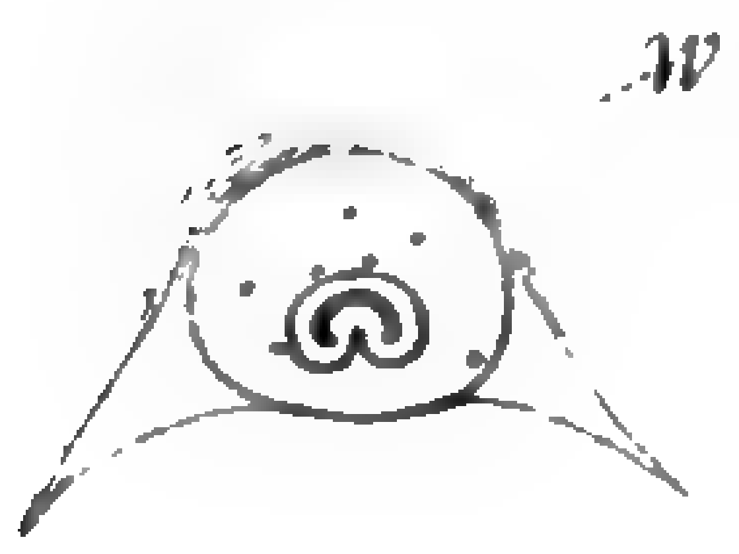


b, × 5. *c*, × 5. *d*, × 5.

e, × 5. *f*, × 5. *g*, × 5.

Todea, the other genus of Osmundaceæ, ought to show some analogy in the form of its vascular bundles with that of *Osmunda*. A transverse section of a young frond of *T. Africana* (fig. 7) disclosed a row of scalariform vessels arranged as a crescent, closely resembling that of *Osmunda regalis*, but simpler. As in *O. regalis*, the fascicle had no dark sheath, but a few black fusiform woody fibres interspersed sparingly in the simple parenchyma of the base of the stipes: a white, soft and

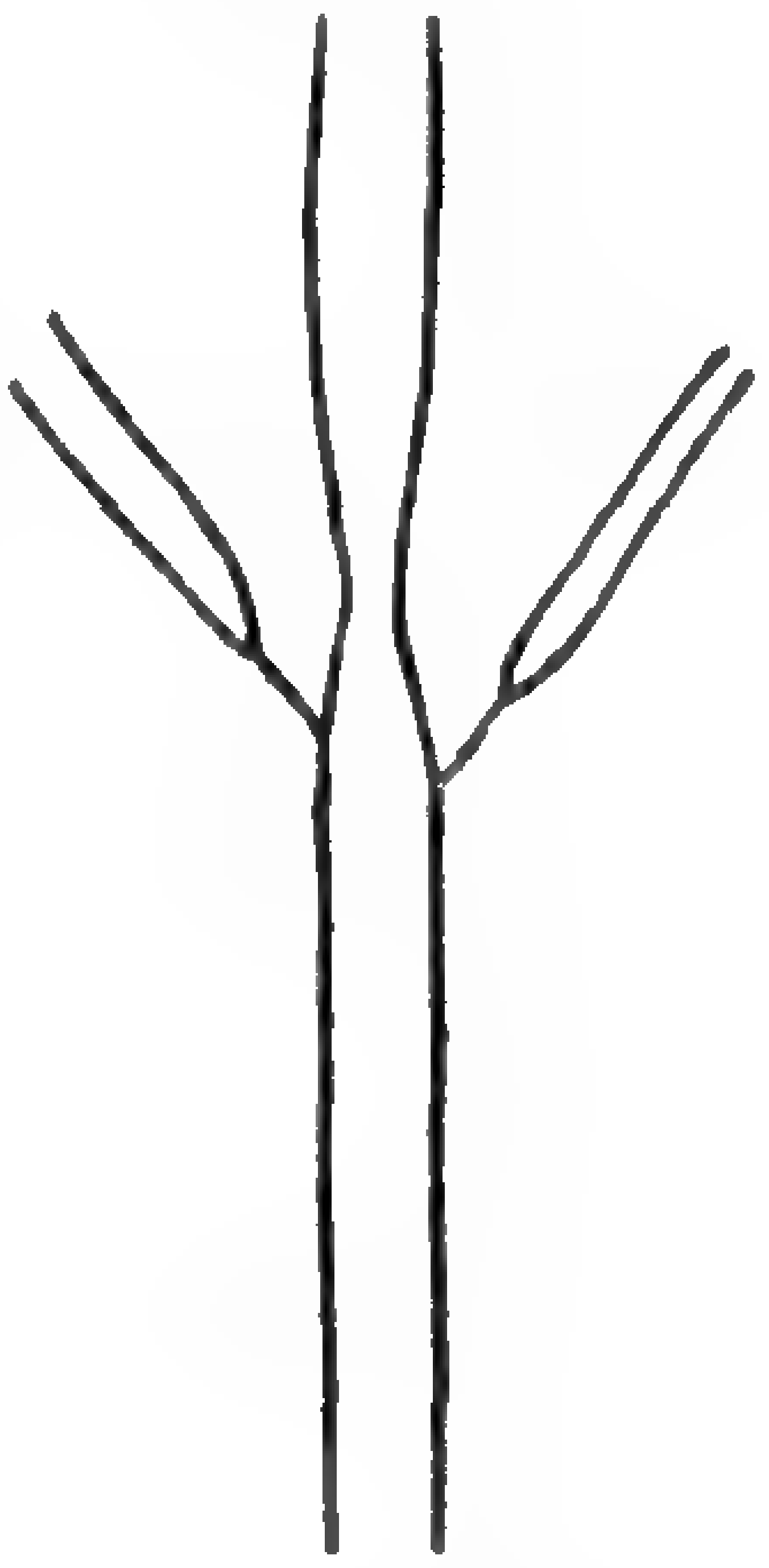
Fig. 7.



fibrous wing on either side of the base of the rachis is another point of resemblance to *Osmunda.*

Gymnocarpium Phegopteris, Newman.
Polypodium Phegopteris, Hooker, Moore.

Fig. 8.



Two vascular bundles* with dark sheaths traverse the stipes, in the foci of whose ellipse they are situate. As the first pair of pinnæ do not originate exactly opposite one another, one of the vascular bundles branches off before the other, sending off into the lowest pinna a single branch, which soon divides into two—these continuing almost to the apex of the pinna: the same phenomena are to be noted with reference to the other vascular cord, and, in both, are repeated to the apex of the frond. Just after each branching of the main cords they approach, but soon recover their relative position. (See fig. 8.)

A few words in conclusion as to the special bearings of the present inquiry. First, it may be affirmed that the disposition of the vascular tissue in all the British varieties and indistinct species of Hooker's genus *Nephrodium* is nearly alike. Secondly, that there is no marked distinction between the genus *Aspidium* (*Polystichum*, M.) and the genus *Lophodium* (*Lastrea*, M.) in this particular. (I have examined many foreign species of *Polystichum* with the same results.) Thirdly, that the genus *Lastrea* of Moore contains two British species (and many foreign ones) which possess a totally different arrangement of their vascular tissue, and that this fact, taken in connexion with the other previously recognized outward differences of these *very same* species, almost warrants their removal to another genus. And fourthly, that genera whose outward characteristics are conspicuously distinct, exhibit marked differences in the arrangement of their vascular fasciculi, while closely allied genera do not.

I will not weary the Society with further details, but beg it to accept the present communication as a small selection from those results at which several hundred observations have enabled me to arrive.

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* In *Polypodium Phegopteris* a close approach to the sigmoid figure in the vascular bundles of *L. Oreopteris* and *L. Thelypteris* is made. The same observation applies to the foreign species *P. hexagonopterum*, and, with modification, to the genus *Onoclea*. The genus *Asplenium* includes two or three apparently distinct arrangements, and demands more complete examination.

Notes on the *Loranthaceæ*, with a Synopsis of the Genera. By DANIEL OLIVER, F.L.S., Professor of Botany, University College, London.

[Read January 15, 1863.]

I HAVE been engaged for some time upon an examination of the Loranthaceæ; and as it is my intention to continue their study chiefly with reference to certain analogies which they present with Gnetaceæ, I venture to lay before the Linnean Society some notes which I have accumulated upon the genera of the Order, which may be useful to botanists working them up in further detail. A Synopsis of the genera follows these notes.

I do not enter, at present, upon the relationship which every one acknowledges to subsist between the Loranthaceæ and Santalaceæ. My opinion strongly inclines to their union as subdivisions of one Order. Indeed M. Baillon may be right in proposing that both Olacineæ and Santalaceæ be united with Loranthaceæ[*]. As, however, in any arrangement based upon the Candollean sequence it would be impossible to arrange these groups consecutively—one Thalamifloral, another Calycifloral, and the third Monochlamydeous, —I fear we shall be apt to follow the more convenient course and keep them apart as hitherto. In the present notice I have omitted *Myzodendron*, which cannot be included in Loranthaceæ as distinct from Santalaceæ, any more than *Henslovia* and an Indian leafless parasite in Sir W. J. Hooker's herbarium, the name of which is uncertain. Mr. Miers's proposal to separate *Myzodendron*, with *Viscum* and some allied genera, from *Loranthus*, erecting them into a distinct Order, *Viscaceæ*[†], rests, I believe, chiefly upon an incorrect view of the structure of the ovary and fruit in these plants. Since the recent researches of Hofmeister into the embryogeny of *Loranthus*, *Viscum*, and *Lepidoceras*[‡], no doubt can remain that these are all characterized by a single erect ovule, often almost entirely adnate with the wall of the ovary. My own observations confirm this view. As is shown by Hofmeister, there has been much confusion of embryo-sacs with ovules by observers. The plants referred by Korthals to *Tupeia* with pendulous ovules (*vide* Mr. Miers in Lindl. Veg. Kingd. 791 *c*) are species of *Henslovia*, as stated by Blume[§]. Mr. Miers describes the embryo of Loranthaceæ, distinguished from Viscaceæ, as "enclosed in thin, almost pellicular albumen, filling the cell," and the fruit as "containing a subcoriaceous putamen." *Loranthus* is figured by Blume, Griffith, and others as with abundant albumen; and so I find it in the seeds of the Indian species which I have examined. In *L. europæus*, too, it is abundant. I cannot doubt, therefore, that Mr. Miers has had old or decayed fruits for examination, in which the albumen had shrivelled up from the enclosed embryo, and that the albumen has been taken for a layer of the pericarp (putamen).

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[*] Adansonia, ii. 380.

[†] Ann. Nat. Hist. ser. 2. viii. 179; and Lindley, Veg. Kingd. 791 *c*.

[‡] Transl. in Ann. Sc. Nat. 4ᵉ sér. xii. 9.

[§] Mus. Bot. i. 243.

In the notes and technical descriptions which follow, I speak of the *calyx* and *corolla* of *Loranthus*, and the *perianth* of *Viscum* and the genera allied to it. I am fully aware of the reasonable objections to this application of terms, but I apprehend they are as little likely to be misunderstood as any I could employ for the purposes of the present communication.

LORANTHUS, *L.*

I have revised the Sections of this large genus as established by Blume, DeCandolle, and Martius, though without a result so satisfactory as I could wish. The divisions of these botanists must furnish the basis of any distribution of the species into natural groups, although the sections of Von Martius appear to have been drawn up with reference too exclusively to Brazilian forms, those of Blume to Asiatic and Archipelago species. I feel convinced that generic value cannot be attached to any of these sections; the principal structural characters upon which they rest applying chiefly to the cohesion of the petals, the number of bracts to each flower, whether one or three, and the form of inflorescence. The more important character afforded by the mode of attachment of the anther to the filament, and which, like the Atlantic, separates the species of the New from those of the Old World, though not without exceptions on both sides, does not appear of such great absolute value in itself as to serve as a mark of generic distinction. The basifixed or versatile anthers I do not find associated generally with any particular set of minor characteristics serving to endorse a generic validity. Some forms differing in this particular, are in other respects nearly the same. Neither do I believe the form of the anthers available for the grouping of species except in a subordinate way, though in two or three sections they are certainly very different from the rest. The genus, as *Loranthus*, is a good and natural one—well-defined and easily recognized; but if broken up, it will be found, as in other too familiar instances, that though many of our genera are recognizable by artificial characters, and some form natural though not always well-defined assemblages of species, yet others would be less favoured, and, without a reference to geographical distribution, not easy to limit or make out. Geographical distribution I conceive to be available only for the artificial distribution of species, &c. for convenience of reference, not for the higher purposes of study. I have endeavoured therefore to be little influenced by it; nevertheless it will be seen that, generally, the distribution of the species of each group is comparatively circumscribed.

VISCUM, *L.*

It is interesting to note that the species having persistent perianth-lobes all belong to the aphyllous group, and, excepting perhaps one or two from the mainland of Asia, are confined to the Archipelago and islands of the Indian and Pacific Oceans.

GINALLOA, *Korthals.*

I have not seen authentic specimens, but I have no hesitation in identifying a few leafy species from the Indian Archipelago, having the flowers in axillary or terminal articulated spikes, with this genus, which, I apprehend, must be maintained on the ground of its free anthers (*i. e.* not adnate to the perianth-lobes), not chambered as in *Viscum*, but either truly two-celled and subdidymous, or opening along the connective on the inner face of the anther. I have had but few male flowers in a state fit for examination, so that possibly further observation may lead to a modification of the generic diagnosis in order that the species which I describe under *Notothixos* may be included in this genus. The *Viscum floccosum* of Mr. Thwaites, with the habit of *Ginalloa*, has the anthers of *Notothixos*. A second Ceylon species, *V. spathulifolium*, Thw., from its very close resemblance to Malayan specimens of *Ginalloa*, I have little doubt must belong to Korthals's genus, though I have not access to staminate flowers to enable me to decide the point.

NOTOTHIXOS, gen. nov.

Viscum cornifolium, Cunningham, *V.* ? *subaureum*, F. Mueller, and *V. incanum*, Hook., from Eastern Australia, I propose to separate generically. They differ from *Viscum* in habit and in the anthers, which are free, more or less reniform, transversely lobed by a faint sutural line, and each lobe obscurely chambered as in some African species of *Loranthus*. This transverse chambering of the anthers is distinct in *N. cornifolius*. From their minuteness in the other species it is with difficulty discernible. In *N. floc-*

cosus the anthers in bud resemble those of *Viscum*; but they are free, and I doubt if the dehiscence be by pores as in that genus. The stellate pubescence of this Ceylon plant is similar to that of two of the Australian species.

ARCEUTHOBIUM, *Bieberst.*

The bifid perianth of the ♀ flowers, which are terminal, or opposite in the axils of the sheaths, distinguishes this genus from *Phoradendron*. I cannot agree with Prof. Grisebach in referring to *Arceuthobium* the West-Indian species described in his 'Flora of the British West Indies' (p. 315). They appear to me undoubtedly aphyllous species of *Phoradendron*.

PHORADENDRON, *Nutt.*

I have not undertaken to arrange subdivisions of this large genus; they will form an interesting study for the botanist who may have to elaborate the Loranthaceæ of the 'Flora Brasiliensis.' The leaves are wanting, or reduced to squamæ, in but few species. The anthers are described as two-celled; and so they usually are in some species, for example in *Ph. flavescens* of the United States; but in others they are certainly one-celled, probably by confluence of the pores or slits of dehiscence. Indeed, in *Ph. flavescens* I have found the anthers occasionally thus one-celled. I have therefore modified the diagnosis in this regard. The species with one-celled anthers, referred to *Arceuthobium* by Dr. Grisebach in his 'Flora of the British West Indies,' appear to me to belong properly to *Phoradendron*. His *Ph. buxifolium* (Pl. Cubenses, 220) and *Ph. serpyllifolium* (Wright, Pl. Cub. no. 1254) have certainly one-celled anthers. A few leafless or nearly leafless species much resemble *Arceuthobium* at first sight, especially those which have the floriferous internodes excessively short and only two-flowered, the flowers being almost or quite in the axils of the sheaths. The flowers are, however, more or less immersed in the rachis, and have three-lobed perianths. The *Castrea falcata* alluded to by St. Hilaire (Leçons, p. 451, and fig. 335) I presume must be a *Phoradendron*.

ANTIDAPHNE, *Poeppig.*

To this imperfectly described genus I refer a Venezuelan plant with ♀ flowers collected by Fendler, and another (♂) by Seemann in Veraguas. I feel no doubt these belong here, having a Peruvian specimen of the original *A. viscoidea* in the Hookerian herbarium, besides Poeppig's rather imperfect figure of it, to guide me. The northern plants are probably distinct species, judging from the venation of the leaves. I am enabled by their aid to correct some inaccuracies in the generic description, which have been adopted by Endlicher, who, after Poeppig, describes the ♂ flower as "tubo filiformi," and with stamina "limbi laciniis alterna." The "tubus" is the pedicel; the "laciniæ," the lobes of a thickened disk. In Seemann's ♂ plant I observe a pair of setiform bract-like processes, which I was in doubt whether to regard as lateral bracteolæ or reduced perianth-segments. As they appear to be opposite to stamens, I conclude they are the latter. The Peruvian plant appears destitute of them. In this genus, as also in *Lepidoceras*, I have noted interesting relations to subsist between the *Nieder-*, *Laub-*, and *Hoch-blätter* of Braun. In describing these, I shall employ the terms used by Mr. Henfrey, derived from Greek roots, viz. *cata-*, *eu-*, and *hypso-phyllary* (scale, foliage-leaf, and bract) leaf-formations. The spikes of both ♂ and ♀ flowers found in the axils of the leaves or clustered about the apices of the branches are at first strobilus-like, covered with numerous dry imbricating scales, the lowermost of which are empty and truly cataphyllary. These pass into others quite similar in structure, though larger, subtending the flowers. After these and continuous with them, though with rather abrupt transition in respect to texture and duration (for the dry scales are caducous), come the young euphyllary leaves, which unfold themselves as the spike elongates. We thus always find the young fruits scattered along the lower, bare portion of the shoots, the bracts having long since fallen away. The upper portion bears the leaves, in the axils of which these formations are repeated. I must refer to *Lepidoceras* for a case somewhat similar, though in some respects more remarkable. Compare also the account of the ramification, &c. of *Myzodendron*, by Dr. Hooker (Flora Antarctica, ii. 290).

EUBRACHION, *Hook. fil.*

It is unfortunate that I am unable to add more to our knowledge of this rare and curious plant. It will be seen in the appended Synopsis that we do not possess technical characters of importance to distinguish it. In habit the plant looks very different from any of its allies. Anyone visiting Uruguay will do well to have an eye to it.

LEPIDOCERAS, *Hook. fil.*

The two species originally described briefly by Dr. Hooker in the 'Flora Antarctica' are the only ones known to me, the

L. punctulatum of Clos in Gay's 'Fl. Chilena' (iii. 163) having been separated by Prof. Grisebach. Clos ought not to have united the two species of Dr. Hooker; they look distinct, and are so held by Grisebach (Pfl. Phil. und Lechl. 23). The proportionally large embryo and reduced albumen in this genus, pointed out by Grisebach and Hofmeister, offer a remarkable feature in the Order. I have seen nothing like it in allied, or indeed any Loranthaceæ. If I understand Hofmeister's figure rightly (Ann. Sc. Nat. 4e sér. xii. t. 3. fig. 32), the membrane of the conical body *g* answers to the 'endocarp' in *Viscum* of Decaisne, which he describes "sous la forme d'une pellicule verdâtre . . . . . parcourue par un réseau vasculaire," and is no part, I think, of the ovule proper, as Hofmeister regards it, although enclosing and (as in *Viscum* at first) entirely adnate with it*.

I have alluded to the relations of the bud-scales, leaves, and bracts in *Lepidoceras* while speaking of *Antidaphne*. My attention was directed to them by the explanation which I stumbled upon of the remarkable scaly tips of the leaves from which the genus derives its appellation. The young ♀ flowers are found in small axillary strobili formed of numerous dry imbricating scales. The outermost and lowest of these scales, as in *Antidaphne*, are empty and truly cataphyllary; the succeeding (hypsophyllary) scales subtend the flowers. These, however, are not caducous, as in that genus, but persistent. As the axis of the cone grows out, the hypsophyllary scales (bracts) become borne up on the apices of the euphyllary or ordinary leaves of the plant by the development of a true lamina continuously with the base of each. The scaly bracts persist, crowning the extremity of the leaves, sometimes separated from them by a constriction, which answers to the narrowed base or petiolar portion of the scale while doing duty as a bract. The scales subtending the ♂ flowers are early deciduous, though, as the leaf-buds are scaly, we find the developed leaves, as in the ♀ plant, terminated with dry scales.

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* With regard to this so-called 'endocarp,' which in most species of *Viscum* and *Phoradendron* is readily separated from the rest of the ripe pericarp by simply squeezing the latter when separated from its peduncle, I feel inclined to believe that it has much in common with a corresponding layer, not however thus easily separable, in *Gnetum*, *Welwitschia*, *Ephedra*, and perhaps other Gymnosperms. In *Viscum* and *Phoradendron* (which appear to have the nucleus always more or less adnate to the wall of the ovary) we find this membrane separating the seed from the viscine cells of the pericarp, with which its outer surface is organically continuous. It is usually (?) traversed vertically by two principal conspicuous bundles of vessels, which often branch a little above. In many cases, however, more than two bundles traverse it: sometimes they are numerous and anastomose, as in *V. album*. When several are present, they may, sometimes at least, be found to converge at the base towards two opposite points. I hope to return to the consideration of this layer at a future time.

EREMOLEPIS, *Grisebach.*

The appended Synopsis shows that I have had imperfect material for the study of this genus, having access only to ♂ flowers of *E. verrucosa* and ♀ of *E. punctulata.* The former are in small axillary strobili, each flower in the axil of a scale-like deciduous bract, and enclosed by two lateral bracteoles (absent in *Lepidoceras*). The perianth I always find 5-partite. As Grisebach describes *Eremolepis* (♂) with '*calyx tripartitus,*' he may have borrowed this character from the figure in the Atlas to 'Fl. Chilena.'

The bark of *E. verrucosa* is studded all over with minute papillæ, which, when traced up the petioles and to the lamina of the leaves, appear to be due to an altered condition of the stomata. This recalls the parallel case of *Myzodendron*, in which genus, as in *Eremolepis*, we have a single species differing from its congeners in the presence of these remarkably hypertrophied organs. *M. punctulatum*, however, being aphyllous, does not so readily permit the observation of a graduated series between the normal and tubercular stomata. The leaves, as observed by Grisebach, are destitute of apical squamæ. I doubt if the Cuban plant of Wright be correctly referred here by Prof. Grisebach in his 'Plantæ Wrightianæ,' 192. The plant is monœcious, though not so described. The perianth-lobes of the ♀ flower are persistent; and there are some other points of difference. I do not venture to separate it under a new name. We must await further discoveries before finally settling what to do with it.

GENERA OF LORANTHACEÆ.

1. NUYTSIA, *R. Br.*

Fructus monospermus, siccus, trialatus. Embryo cotyledonibus 3–4 inæqualibus.

N. floribunda, R. Br., we have from Murchison River, Swan River, and King George's Sound. Of the *N. ligustrina*, A. C., of Mueller's 'Fragmenta,' ii. 130, from New South Wales, no fruit has been seen that I am aware of. It remains therefore a doubtful congener.

2. LORANTHUS, *L.*

A. Antheræ dorso affixæ (in speciebus plurimis sectionis *Struthanthi* parvæ, prope basin affixæ).—*Notanthera,* A. P. De-Candolle, Mém. Loranth. 17.

I. Flores parvi, sessiles, singuli in fovea rhacheos inserti, vel in axillis foliorum dense congesti, bractea bracteolisque minutis abortivisve.

a. Inflorescentia spicata.

§ 1. *Oryctanthus,* Griseb. Fl. Brit. W. Ind. 313.

Bracts at first imbricating, at length obsolete or, with the bracteoles, as minute scales in the depressions. Anthers usually alternately shorter, and, especially the shorter ones, minutely apiculate. The connective is sometimes dilated in front, sometimes narrow. The petals are free. The spikes in some species much abbreviated. —(*Euloranthus* § *Stachyanthi,* DC., in part*.)

Hab. Mexico, Panama, W. Indies, Columbia and New Granada, N. Brazil.

b. Flores dense glomerati v. fasciculati, axillares.

§ 2. *Phthirusa,* Mart. Regensb. Flora, 1830, 110.

The flowers I find 4–6-merous, and the connective, at least in some species, apparently adnate to the petals.

Hab. Brazil.

II. Flores pedicellati v. sessiles, singuli bractea bracteolisque tribus sejunctis vel connatis vel bractea cupuliformi fulti.

a. Flores parvi, 6–5-meri, in racemis axillaribus. Stamina filamentis brevibus subnullisve.

§ 3. *Dendropemon* et *Lipotactes,* Blume, Fl. Jav. Loranth. 13.

The flowers are sometimes nearly sessile and spicate. Bract and bracteoles confluent, forming small 3-lobate or entire cupules. Petals usually 6, at length free. Stamens alternately longer. Anthers often reniform and apiculate. *L. pauciflorus,* Sw., the only species of Blume's Section *Lipotactes,* does not differ materially from the rest. The anthers are not quite sessile.

Hab. W. Indies.

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* I refer here also *Spirostylis,* Presl (Schultes, Syst. Veg. vii. 163). Mr. Bentham's *Loranthus Grahami* (Pl. Hartwegianæ, 62) is the only species I have seen; and I think it probably the same as Schultes described.

The flowers seem 1-sexual by abortion; the anthers being imperfect in the ♀, and the style straight and reduced in the ♂. I scarcely think the twisting of the style is of sectional importance. The flowers are rather larger than in § *Oryctanthus* generally, being near ¼ in. in length.

The *L. diversifolius*, Benth. Pl. Hartweg. 63, I am at a loss to know what to do with, unless I leave it here for the present. Each flower has a small subcupulate bract, which is sometimes reduced to a mere ring.

b. Flores in corymbos v. paniculas cymosas vel racemos compositos terminales v. axillares, raro in racemos simplices v. spicas dispositi, in speciebus paucis solitarii v. geminati axillares, sæpius 1–3 unc. longi.

§ 4. *Psittacanthus*, Mart., et *Tristeryx*, Mart. Reg. Flora, 1830, 15. 17.

The Eastern species with basifixed anthers included in *Tristeryx* and *Psittacanthus* by Martius are, of course, excluded. As the cupule supporting the flower in *Psittacanthus*, Mart., in many, if not in all, cases appears to result from the coalescence of three organs, viz. the bract and two bracteoles, I am not able to make a separate section of his *Tristeryx*, in which the bracts are free or only partially connate. *Loranthus aphyllus* of Mr. Miers is very near to *L. tetrandrus*, R. & P., the only species retained in *Tristeryx* by Blume. The petals are at length usually free.

Hab. Mexico, Central America, West Indies, Brazil, Uruguay, and Western S. America to Chili.

III. Flores "subternatim dispositi totidemque bracteis suffulti."

a. Flores sessiles aut raro subsessiles, sæpius parvi.

§ 5. *Struthanthus*, Mart. Reg. Flora, 1830, 102.

Flowers in terminal or axillary racemes or racemose panicles, seldom over $\frac{1}{3}$, rarely $\frac{1}{2}$ in. long. (*Euloranthus* § *Protostelides*, DC. *Passowia*, Karst. in Bot. Zeit. 1852, 305.)

Hab. W. Indies, Panama, Mexico, Guiana, Venezuela, Brazil, Uruguay, and Western S. America to Chili.

b. Flores subternatim dispositi, pedicellati vel centrali sessili, singuli 1-bracteati, bractea calycem frequenter superante plus minus foliacea raro 0. (Flores in speciebus paucis in racemis terminalibus subterni v. alterni bractea cucullari calycem sæpe superante.)

§ 6. *Taguana.*

Including the '*Oscillantheræ Taguanæ*' of M. DeCandolle, referred to *Struthanthus* by Blume, and *Gaiadendron* of Don, Gen. Syst. iii. 431. They seem to form a distinct natural group with terminal inflorescence and rather large flowers.

Hab. S. America: New Granada, Columbia, Peru, Chili, and S. Brazil.

A few E. or S.E. Australian and Polynesian species I refer here for the present, including *L. eucalyptoides* and *L. celastroides.* These do not consort well with the American species.

IV. Antheræ dorsofixæ, immobiles.

§ 7. *Loxanthera,* Blume, Fl. Jav. 15.

This curious mode of attachment of the anther appears confined to one or two species of the Indian Archipelago and Malacca. It is well figured by Blume, *op. cit.* t. 23. *c.* Of the Malacca plant I have seen flowers only.

B. Antheræ basifixæ v. adnatæ.

I. Flores singuli tribracteati (bractea 1, bracteolis 2).

a. Flores singuli in foveam rhacheos leviter inserti, in spicis axillaribus paucifloris decussatim oppositi, bracteis primum tecti.

§ 8. *Elytranthe,* Blume, Fl. Jav. Loranth. 16.

Petals 5-6, connate below.
Hab. India.

b. Flores pedicellati v. sessiles, sæpius racemosi aut cymosi, axillares, interdum in nodis subsessilibus.

§ 9. *Macrosolen,* Blume, Fl. Jav. Loranth. 16.

Petals 5–6, united below, or sometimes free. (*Symphyanthus* § *Anguliflori,* DC.)
Hab. India.

II. Flores capitulatim congesti, bracteis numerosis imbricatis involucrati. Petala 6 coalita.

§ 10. *Lepeostegeres,* Blume, Fl. Jav. Loranth. 18.

A very remarkable and distinct section, so far as inflorescence is concerned. In a plant from the Philippines the bracts seem considerably fewer than in the other species.
Hab. Borneo, Java, Philippines.

III. Flores 4–6, congesti, bracteis totidem distinctis v. involucro 1-phyllo coalitis cincti.

§ 11. *Tolypanthus,* Blume, Fl. Jav. Loranth. 18.

L. lageniferus, figured by Wight (Ic. 306), is the only species I know in which the bracts form a monophyllous involucre.
Hab. India.

IV. Flores sæpius pedicellati, singulatim 1-bracteolati. **Petala** coalita. (*Dendrophthoë*, Mart. Reg. Flora, 1830, 109.)

a. Flores sæpius 4-meri. Ovarium demum obconicum v. clavatum.

§ 12. *Cichlanthus*, Endl. Gen. Pl. 802.

Hab. India and the Archipelago.

b. Flores sæpius 5–6-meri, corolla subindo lateraliter fissa. Ovarium basi rotundatum.

§ 13. Subsect. i.

Eudendrophthoë, Endl. *l. c.*—Flores sæpius racemosi vel racemis reductis abbreviatisve geminati v. fasciculati, raro solitarii aut in speciebus perpaucis (*L. sclerophyllus*, Thw. &c.) umbellati, corolla basi nunquam inflata.

Hab. India and the Archipelago. Australia.

c. Flores 5 (rarius 4) -meri, axillares, geminatim ternatimve fasciculati, interdum solitarii aut umbellati, raro racemosi, pedicellati v. sessiles, singuli unibracteati.

§ 13. Subsect. ii.

(*Tapinanthus*, Blume, Fl. Jav. Loranth. 15, in part?)

The corolla is frequently much dilated at the base, the cells of the anthers in some species multilocellate, and the filament often more or less produced at the base of the anther. I do not find that these afford sectional characters.

Hab. Africa: Abyssinia, West Tropical Africa, Cape, Natal, &c.

d. Flores 4-meri, racemosi, bracteis minutis obsoletisve.

§ 14.

L. flavidus, Hk. f., of New Zealand.

V. Flores 5-meri, geminatim v. umbellatim dispositi, singuli 1-bracteati. Petala libera v. basi æqualiter coalita.

§ 15.

Hab. A very few species of Abyssinia and the Cape (*L. undulatus*, E. M., and *L. Acacieæ*, Zucc.).

VI. Flores sæpius subternatim cymosi v. umbellatim v. cymosim paniculati, axillares, raro solitarii v. geminati, pedicellati v. sessiles, singuli 1-bracteati. Petala discreta 5, 6, 4.

§ 16. (*Euloranthus* § *Stylosi*, DC.)

The flowers are usually 5-merous; in the New Zealand species

4-merous. In one species, *L. bracteatus*, F. M., the flowers are enclosed in a pair of opposite foliaceous bracts.

Hab. Australia, New Zealand, Polynesia.

VII. Flores racemosi v. spicati, raro in nodos fasciculati, 1-bracteolati vel in foveam rhacheos leviter inserti, bractea plus minus obsoleta. Petala libera. (*Loranthus*, Mart. Reg. Flora, 1830, 102; Blume, Fl. Jav. Loranth. 12, in part. *Euloranthus*, Endl. Gen. Pl. 801, in part. *Phœnicanthemum*, Blume, *op. cit.* 13. *Lanthorus* ?, Presl, Epim. Bot. 256.)

a. Flores dioici, spicati.

§ 17.

Loranthus europæus is the only species which I can refer here.

b. Flores hermaphroditi. (*Euloranthus* § *Breviflori*, DC.)

§ 18.

This group may be artificially divided either by the symmetry of the flowers, or the inflorescence, whether racemose or spicate. In *L. odoratus*, Wall., very near *L. europæus*, they are partially immersed in the rachis. The petals are often dilated at the base (*Euloranthus* § *Unguiculati*, DC.), but I am not able to base a section upon this character.

Hab. India and the Archipelago; and two new African species (tetramerous) from the Island of St. Thomas and E. Tropical Africa, which I describe.

LORANTHUS MANNII, sp. nov. Cortice glabro punctato, foliis oppositis suboppositisve lanceolatis vix acuminatis apice obtusiusculis eveniis glabris petiolatis, floribus tetrameris racemosis, pedicellis calycem æquantibus, bracteis minutis, racemis axillaribus.

Hab. St. Thomas, alt. 5000 feet. Coll. G. Mann.

The linear anthers are adnate, two-celled, and each cell multilocellate, as in several other African species.

Leaves 2–3 in. × $\frac{6}{10}$–1 in., petiole $\frac{2}{10}$–$\frac{4}{10}$ in. Flowers $\frac{5}{10}$–$\frac{6}{10}$ in., usually curved to one side before expansion.

L. KIRKII, sp. nov. Cortice glabro plus minus striato, foliis oppositis alternisve ovatis v. ellipticis aut obovato-ellipticis obtusis glabris petiolatis, floribus in racemis terminalibus elongatis ∞-floris, pedicellis patentibus, bractea parva laterali, petalis 4.

Hab. Rovuma Bay, W. Africa, lat. 10° S. Coll. Dr. Kirk.

Branches slightly verrucose below. The racemes always terminal. Leaves $\frac{3}{4}$–2 in. × $\frac{3}{4}$–$1\frac{1}{2}$ in. Racemes 4–6 in. Flowers $\frac{3}{10}$–$\frac{4}{10}$ in.

VIII. Flores 4-meri petalis discretis. Stylus contortus. Bacca viscida.

§ 19.

Another solitary New Zealand species, *L. micranthus*, Hk. f.

IX. ? Folia verticillata v. alterna. Flores umbellati singulatim 1-bracteati sæpius subternatim dispositi, vel racemosi ternatim sessiles, bracteis totidem fulti.

§ 20. (Umbellatæ.)

Hab. Philippines and Malayan Archipelago. In one species the flowers are subsessile from the nodes. (Includes Cuming's Nos. 1947, 1952, 1956, 1957, 1958, 1964.)

§ 21. (Racemosæ.)

Hab. Philippines. (Cuming's Nos. 1945, 1976, &c.)

X. ? Flores di–trichotome cymosi, singuli bracteati, bractea cupulata obliqua v. lobata, 2½–9 unc. longi. Petala inferne coalita.

§ 22.

A few South American species included in *Psittacanthus* by Martius and Blume. I have separated them because of their adnate anthers, limiting *Psittacanthus* to species in which they are versatile.

Hab. Ecuador, Columbia, and the Amazon Valley. (Includes *L. macranthus*, Hook. Icones Pl. 743–4.)

Lichtensteinia, Wendl. (Sect. 6 of Blume, Flor. Jav. Loranth. 14), I omit, having been founded upon an error.

3. Viscum, *L.*

Flores dioici v. monoici. *Fl. masc.* Perianthium 4–3-fidum; antheræ cum lobis perianthii adnatæ poris plurimis dehiscentes. *Fl. fœm.* Perianthium 4–3-lobatum. Stylus 0 vel brevis stigmate obtuso.

A. *Aphylla.*

1. *Perianthii lobis persistentibus.* (Flores ♀ in glomerulis oppositis v. interdum verticillati.) Includes species of India, Indian Archipelago, Mauritius and Bourbon, Australia, Polynesia, New Zealand. (*V. moniliforme*, *V. phyllanthus*, Cunn., *V. distichum*, &c.)

2. *Perianthii lobis caducis.* (Flores ♀ singulatim ternatimve bibracteolati, bracteolis sæpe connatis basin fructus cingen-

tibus.) Includes Indian, South African, Mauritian, and a few Australian species.

B. *Foliosa.*

1. *Perianthii lobis caducis.* (Flores singulatim v. 2-, 3-, 4-, 5-natim bibracteolati, vel flore terminali bibracteolato lateralibus 1-bracteolatis, vel bracteolis obsoletis.) Species of Europe, S. Asia, Central and S. Africa, &c. No Australian species. Includes *V. orientale, V. album,* &c.

4. GINALLOA, *Korthals, Verh. Bat. Genootschap.* xvii.

Flores monoici. *Fl. masc.* Perianthium 3 (4)-fidum; antheræ subsessiles, liberæ, biloculares. *Fl. fœm.* Perianthium 3 (4)-lobatum lobis persistentibus.—Folia opposita, sæpius 3-nervia; flores spicati, spicis articulatis, in articulis fasciculati v. solitarii oppositi, bracteis coalitis cincti.

A few species from the Malay and Indian Archipelago and Ceylon?, including *G. Arnottiana,* Korth., and *Viscum spathulifolium* (?) of Mr. Thwaites.

5. NOTOTHIXOS, gen. nov.

Flores monoici. *Fl. masc.* Perianthium 4 (raro 5) -fidum; antheræ sessiles, liberæ, sutura transverse lobatæ, lobis parallelis obscure ∞-locellatis. *Fl. fœm.* Perianthium 4 (3) -lobatum, lobis persistentibus.—Folia opposita, 3–5-nervia; flores capitellati, terminales, capitulis 3–9-floris pedunculatis v. subsessilibus solitariis v. geminatim v. ternatim v. paniculatim dispositis; in spec. Zeylanica flores spicati sunt.

1. N. CORNIFOLIUS. Paniculis terminalibus, floribus in capitulis 5–9-floris patentim pedunculatis bibracteolatis digitatim dispositis, foliis obovato-lanceolatis v. obovatis v. lanceolatis obtusis deinde emarginatis retusisve glabris glabrescentibusve.

Viscum cornifolium et *V. xanthophyllum,* Cunn. MS.

Hab. Hunter River and Liverpool Plains, N.S.W., Sydney, *Dr. Hooker.* —β. *angustifolia.* Brisbane River, *Cunningham, Fraser.* Moreton Bay, Queensland, *Cunningham.*

2. N. SUBAUREUS. Floribus in capitulis terminalibus 5–9-floris pedunculatis bibracteolatis radiatim dispositis, pedunculis simplicibus geminatisve aut ternatim ramosis, foliis ellipticis ovalibus vel ovato-lanceolatis obtusis v. subacutis subtus pilis aureis stellatis pubescentibus.

Viscum subaureum, F. Mueller.

Hab. Moreton Bay and Brisbane River, *Mueller.* Lake Macquarie, *Backhouse.*

Whole plant, especially the young parts, more or less clothed with golden

stellate pubescence, the upper side of the leaves at length glabrescent. Leaves shortly petiolate. Peduncles shorter than the branches from the fork of which they spring.

3. N. INCANUS.—*Viscum incanum*, Hook. Ic. Plant. i. t. 73.
Hab. Brisbane River, Queensland, *Fraser.*

4. ? N. FLOCCOSUS.—*Viscum floccosum*, Thwaites, MS.

6. TUPEIA, *Ch. et Schlecht. Linnæa*, iii. 203.

Flores dioici. *Fl. masc.* Perianthium 4-partitum; stamina libera, filamentis elongatis, antheris ellipticis bilocularibus longitudinaliter dehiscentibus. *Fl. fœm.* Perianthium 4-lobatum, lobis caducis; stylus validus, sejungens stigmate capitato. Semen albumine copioso.

One New Zealand species (*T. antarctica*). Dr. Lauder Lindsay sends a narrow-leaved form from Otago.

7. ARCEUTHOBIUM, *Bieb. Fl. Taur. Cauc. Suppl.* 629.

Flores dioici. *Fl. masc.* Perianthium 3-, 4- v. 5-partitum; antheræ sessiles, uniloculares, rimula transversa dehiscentes. *Fl. fœm.* Perianthium bidentatum; stigma sessile.—Species aphyllæ.

Includes *A. oxycedri* from Southern Europe, Western Asia, California, the Rocky Mountains, and Mexico. A plant of Seemann's from N.W. Mexico (2138) seems to be the ♂ of a distinct species. Fendler, New Mexico, 283, may be another species; but more material is needed for the determination of these.

8. PHORADENDRON, *Nuttall, Journ. Ac. Phil.* i. 185.

Flores dioici vel monoici. *Fl. masc.* Perianthium 3-fidum; antheræ lobis imis adnatæ, transverse biloculares, poris s. rimulis verticalibus duabus dehiscentes, v. interdum rimulis confluentibus uniloculares. *Fl. fœm.* Perianthium 3-lobum (rarius 2–4-lobum), lobis persistentibus; stigma sessile, obtusum.—Frutices sæpius foliosi, paucis aphyllis. Flores sessiles, spicati, rhachi plus minus immersi, spicis interdum abbreviatis.—*Spiciviscum*, Engel. Pl. Fendl. 58, et Karst., "nec Engelm." Fl. Columb. 73, t. 36; *Allobium*, Miers, A. N. H. ser. 2. viii. 178.

All American, so far as I have had opportunity of ascertaining, extending from the United States (*Ph. flavescens*) and California, through Texas, Mexico, West Indies, to Peru and Brazil. Engel-mann (Gray, Pl. Fendlerianæ, p. 58 in note) describes the perianth, both ♂ and ♀, as rarely 2- or 4-lobate. So does Dr. Gray (Bot. Northern States, ed. 2. 382). I have seen it so sometimes in *Ph. flavescens*; but in the other species which I have examined I have found only a 3-lobate perianth.

9. ANTIDAPHNE, *Poeppig, Nov. Gen.* ii. 70, t. 199.

(CHAR. EMEND.) Flores monoici v. dioici. *Fl. masc.* Perianthium 0 aut subnullum in segmenta setiformia reductum; stamina 3 v. 4, filamentis distinctis, antheris ovatis v. oblongis bilocularibus longitudinaliter dehiscentibus. *Fl. fœm.* Perianthium sæpius 3-lobatum, segmentis remotiusculis parvis, vel (fide Poepp.) margine undulato; ovarium limbo paullo longius; stylus brevissimus, stigmate capitato.—Folia alterna, 3–∞-nervia, crassiuscula, integra. Flores ♂ strobiliformiter spicati, singulatim v. 2–3-natim bracteati, bracteis squamiformibus caducis sessilibus v. basi angustatis. Stamina sæpe inæqualia; discus crassus, lobatus. Flores ♀ sessiles, sæpius ternatim bracteati, bracteis caducis.

Of the Peruvian species I have seen only a rather imperfect specimen, collected at Casapi by Matthews; but I have no hesitation in identifying the Venezuelan plant No. 1125 of Fendler, and Seemann's No. 1619 from Veraguas, with Poeppig's genus. They are probably distinct species, but we have only male or female flowers from either locality.

10. EUBRACHION, *Hook. fil. Fl. Antarct.* ii. 291 *adnot.*

Flores monoici, in spicis androgynis brevibus lateralibus. *Fl. masc.* Perianthium 3-partitum; stamina filamentis brevissimis, antheris bilocularibus didymis longitudinaliter dehiscentibus. *Fl. fœm.* Perianthium 3-lobum; stylus brevissimus, stigmate obtuso.

Flowers, both ♂ and ♀, sessile in the axil of small, rotundate, much-thickened scales. The specimens which I have seen are so imperfect, that it is not easy to construct a more contrasting diagnosis. But one species is known—*E. Arnottii* (*Viscum ambiguum*, Hook. et Arn. Bot. Misc. iii. 356), collected by Tweedie in Uruguay.

11. LEPIDOCERAS, *Hook. fil. Fl. Antarct.* ii. 293 *adnot.*

Flores dioici. *Fl. masc.* Perianthium 4-partitum; antheræ biloculares, longitudinaliter dehiscentes. *Fl. fœm.* Perianthium

4-lobum, lobis caducis; stylus brevis, stigmate obtuso. Semen albumine parco v. subnullo.—Folia squamula sicca apicali instructa. Flores ♂ racemosi, pedicellati, bracteis squamæformibus caducis: ♀ primum in spicis strobiliformibus sessiles, deinde (fructu) solitarii in axillis foliorum.

The only species known to me are, as above explained, *L. Kingii* and *L. Dombeyi*, Hk. f., from Peru, Chili, and the island of Chiloe.

12. EREMOLEPIS, *Griseb. Pfl. Phil. und Lechl.* 36.

Flores dioici (fide Grisebach, *l. c.*). *Fl. masc.* (in *E. punctulata*): Perianthium 5-partitum; stamina filamentis brevissimis, antheris bilocularibus longitudinaliter dehiscentibus. *Fl. fœm.* (in *E. verrucosa*): Perianthium 3-lobatum, lobis caducis; stylus brevissimus, stigmate obtuso. Semen embryone cylindrico, albumine copioso.—Folia alterna, squamulis apicalibus destituta. Flores ♂ sessiles, bracteati, in bracteolis 2 lateralibus alabastri inclusi. Perianthium lobis crassiusculis apice mucrone parvo inflecto instructis. Pistillum rudimentarium, minute 3-fidum. Flores ♀ in spicis paucifloris brevissimis quasi glomerulati, sessiles, bracteis parvis caducis.

E. verrucosa and *E. punctulata* are the only species known to me, unless Grisebach be right in referring to this genus the following (*vide supra*, p. 96).

13. Genus novum? (*Eremolepis Wrightii*, Griseb. Pl. Wright. 192.)

Flores monoici. *Fl. masc.* Perianthium 4-partitum; stamina filamentis brevissimis, antheris bilocularibus oblique lateraliter dehiscentibus. *Fl. fœm.* Perianthium 3–4-lobum, lobis persistentibus. Albumen copiosum.—Folia alterna. Flores in spicis brevissimis paucifloris axillaribus, bracteati, bracteis parvis triangularibus.

On the Spicula contained in the Wood of the *Welwitschia*, and the Crystals pertaining to them. By Colonel PHILIP YORKE, F.R.S. In a letter to Dr. J. D. HOOKER, F.R.S., &c.

[Read February 5, 1863.]

Febr. 4, 1863.

DEAR DOCTOR HOOKER,—I send you a note of my observations on the spicula contained in the wood of the Welwitschia, and the crystals pertaining to them.

I found, as I believe you had already, that when the spicula were immersed in dilute hydrochloric acid, even though they remained in the liquid several hours, there was no action on the crystals.

Also that when the spicula were placed in a platinum spoon with hydrofluoric acid and heated, and when the same was done with a solution of caustic soda, there was no apparent action on the crystals.

On the other hand, when the spicula were boiled in nitric acid, the crystals disappeared.

I then found that when a few spicula were carefully burned by heating them on platinum foil over a small spirit-flame, a white ash remained of the form of the spicula; and when this ash, moistened with water, was examined by the microscope, it was found to be made up of a congeries of the crystals unaltered in form, and acting on polarized light.

When a drop of dilute hydrochloric acid was added, the crystals disappeared, and, I thought, with effervescence. I then made the following experiment.

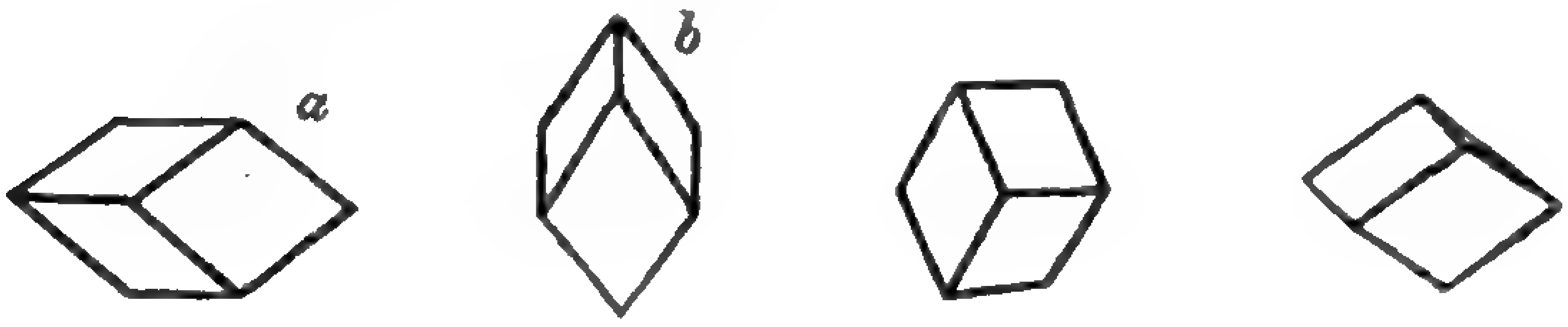
A quantity of the spicula was collected which weighed 0·105 gr.; this was carefully burned as before; the ash weighed 0·010 gr., or just 10 per cent.: water added to the ash, the liquid slightly restored the blue of reddened litmus; a drop of hydrochloric acid added, the ash dissolved with brisk effervescence; and when this, neutralized by ammonia, was tested by oxalate of ammonia, a considerable precipitate formed.

The supernatant liquid was removed, and tested by phosphate of soda; but a very minute, if any, precipitate was thus formed.

This experiment shows that the substance examined is essentially carbonate of lime, possibly with a little carbonate of magnesia.

The form of the crystals also supports this view, though their minuteness renders the examination difficult. By far the greater number of the crystals presented a rhombic outline, the largest measuring in their longer diagonal $\frac{1}{2000}$th of an inch. I obtained

Sketches of the crystals.



some approximation to the measure of the angles by means of a doubly refracting prism fitting on to the eye-piece of the microscope; the mean of several measures gave 106° nearly as the value of the obtuse angle (that of calc-spar being 105° 5′). With regard to the prismatic-looking crystals occasionally seen, I found several which, examined by favourable light, presented the figure *a*, *b*.

This form of rhomboid resembles that which was called by Haüy the "inverse," a peculiarity of which is, that its plane angles measure the same as the dihedral angles of the primary rhomboid.

The crystals of the so-called crystallized sandstone of Fontainebleau (which are carbonate of lime containing sand) are instances of this form.

As it appears from what I have stated that these crystals consist of carbonate of lime, the question remains, What is it that protects them from the action of acids?

I have made some attempts, but very imperfect, to throw some light on this question.

I found that alcohol and ether, even when heated, had not the power of removing the protecting substance.

But I found that if, after digesting with ether, the spicula were boiled in solution of caustic soda and subsequently immersed in dilute hydrochloric acid, the crystals disappeared, and their places were occupied by amorphous patches.

There is one objection that may perhaps be taken to the view I have adopted as to the nature of the crystals, which I may as well notice. It may be thought that in the plant the lime was united to some organic acid, say the oxalic. But I think it will be admitted that, putting aside the agreement in form with carbonate of lime, the fact of the crystals being unaltered in form by burning, and retaining the power of acting on polarized light, is fatal to such an hypothesis.

I remain,
Dear Doctor Hooker,
Very truly yours,
PH. YORKE.

Joseph D. Hooker, Esq., M.D., &c. &c.

On some new Species of *Amomum* from West Africa. By Professor OLIVER, F.L.S., and DANIEL HANBURY, Esq., F.L.S.

[Read April 16, 1863.]

WE have in preparation a monograph of the West African species of *Amomum*; but as there are yet some points to be cleared up, requiring further communication with residents at Sierra Leone and the ports of Liberia and of the Gulf of Guinea, we shall not be in a position to complete it during the present session of the Linnean Society. It appears, however, to be desirable that brief diagnoses of the new species should at once be laid before the Society, and we have accordingly prepared the following.

Specimens of all the plants described have been received, both in the dried state and preserved in fluid, accompanied in most cases by coloured sketches, from Mr. Gustav Mann, the able and persevering botanical collector to the Royal Gardens, Kew. In the Museum and Herbarium of this establishment the authentic specimens are deposited.

AMOMUM, *L.*

* *Scapi uniflori. Semina ellipsoidea, nitida.*

1. A. ARUNDINACEUM, sp. nov. Foliis lineari-lanceolatis, glabris, subsessilibus, scapis gracilibus 2–3 unc. longis, bracteis brevissime apiculatis, labello erecto rotundato-obovato, fructu late ovoideo nudo vel subnudo.

Hab. Corisco Bay, 1862, *G. Mann.*

** ***Flores* 2–10 *congesti, in scapis simplicibus aut distiche ramosis.***

a. Labellum erectum, amplum, roseum v. purpureum. Folia glabra.

† *Scapi* 1–2-*pedalis, distiche ramosi.*

2. A. GIGANTEUM, sp. nov. Foliis amplis, elongatis, lanceolato-oblongis oblanceolatisve petiolatis, scapi ramulis sæpius bifloris, antheræ crista lobo centrali producto quadrato-oblongo bifido v. subintegro, fructu ovali-lanceolato, seminibus ellipsoideis nitidis.

Hab. Gaboon River, 1861, *G. Mann.*

†† *Scapi simplices, aut breves basi ramosi.*

3. A. SCEPTRUM, sp. nov. Foliis auguste oblongo-lanceolatis, petiolatis, ligula scariosa, scapis simplicibus apice clavato-turgidis circa 10-floris, bracteis superioribus dorso apiculatis, tempore florifero transverse plicatis, fructu ovoideo-compresso v. subtrigono glabro, pericarpio crasso, seminibus angulatis.

Hab. Gaboon River, 1861, *G. Mann.*

4. A. **Mannii**, sp. nov. Foliis oblanceolatis ellipticisve abrupte acuminatis, petiolatis, scapis 2–3 unc., 3–2-floris, bracteis brevissime apiculatis v. muticis, labello late obovato-rotundato.

Hab. Corisco Bay, 1862, *G. Mann.*

b. Labellum erectum, amplum, roseum v. purpureum. Foliis subtus minute pubescentia v. margine breviter pilosa. Staminodia libera.

5. A. **subsericeum**, sp. nov. Foliis lanceolatis acuminatis, brevi-petiolatis, subtus pubescentia venulis transverse intertexta subsericeis, scapis brevibus sæpius bifloris, fructu ovato-lanceolato v. ovoideo, seminibus ellipsoideis nitidis.

Hab. Gaboon River and Corisco Bay, 1862, *G. Mann.*

6. A. **limbatum**, sp. nov. Foliis oblongo-lanceolatis, acumine tenuiter caudatis, brevissime petiolatis v. sessilibus, subtus nervo medio atque margine brevissime ferrugineo pilosis, scapis brevibus 3-floris, fructu ovoideo, seminibus ellipsoideis nitidis.

Hab. Fernando Po, 1859 and 1861, *G. Mann.*

c. Flores parvi, lutei. Folia pilosa. Staminodia coadunata.

7. A. **pilosum**, sp. nov. Foliis elongato-lanceolatis acuminatis, breviter petiolatis, sparse pilosis, scapis brevibus bifloris, labello limbo transverse elliptico subcordato v. fere integro, fructu parvo obovoideo in tubo persistente perianthii repente contracto, seminibus perparvis transverse rugulosis.

Hab. Fernando Po, 1862, *G. Mann.*

*** *Scapi breves, obconici, capitati,* 10–15-*flori. Folia glabra.*

8. A. **citratum**, *Pereira, Pharm. Journ. and Trans.* ix. 313*. Foliis elongatis, oblongo- v. obovato-lanceolatis, breviter acuminatis, petiolatis, scapis crassis, bracteis superioribus margine crispatis, labello amplo erecto, fructu obovoideo limbo lato perianthii persistente continuo coronato, seminibus obscure angulatis tuberculatisque, apice breviter conico productis.

Hab. Gaboon River.

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* As no description of this species has yet been published, we include its diagnosis in the present paper.

Note on the Embryo of *Ancistrocladus*. By G. Bentham, P.L.S., and J. D. Hooker, F.L.S.

[Read May 7, 1863.]

In the 'Genera Plantarum,' Part I. p. 191, we have fallen into an error in our description of the seed of *Ancistrocladus*, which error, as it affects the accuracy of the observations and drawings of so careful and excellent a botanist as Mr. Thwaites, which are published in our 'Transactions' (vol. xxi. p. 225. t. 24), we are desirous of correcting also in the Society's publications.

In the above-mentioned paper Mr. Thwaites describes the seed, from living specimens, as "Semen cerebriforme, erectum; testa plicato-intricata, albumen carnosum plicis involventi. Embryo orthotropus, clavatus; cotyledones subfoliacei, divergentes; radicula prope hilum posita."

When drawing up the generic character of *Ancistrocladus* for our work, we examined several seeds, and found their appearance to be not only as described by Mr. Thwaites, but so closely to resemble those of *Doona* and other *Dipterocarpeæ* (to which order we referred *Ancistrocladus* on other grounds), that we were led to suspect the accuracy of Mr. Thwaites's observation. Proceeding then to macerate the seeds, we found that in no case were we able to free the radicle from the supposed cotyledons, but that these appeared to be organically connected, whence we were led to describe what Mr. Thwaites called a ruminated albumen as contortuplicate cotyledons.

Mr. Thwaites, on receiving the 'Genera Plantarum' and observing our error, had the kindness to send to us ripe seeds of *Ancistrocladus* preserved in spirits, which clearly proved us to be in fault.

We may observe that this does not affect our view of the affinity of the genus being with *Dipterocarpeæ*, but adds one more to the already great proportion of exalbuminous Natural Orders in which albuminous genera occur.

Kew, May 5, 1863.

On the Identification of the *Acanthaceæ* of the Linnean Herbarium, in the possession of the Linnean Society of London. By T. Anderson, M.D., F.L.S., Officiating Superintendent of the Botanic Garden, Calcutta.

[Read April 2, 1863.]

Before leaving England for India in the beginning of 1861, I was able to devote some time to the examination of the *Acanthaceæ* existing in Linnæus's Herbarium, now the property of the Linnean Society. As the *Acanthaceæ* are eminently tropical, comparatively few species of the order were known to botanists of the time of Linnæus. Consequently the limits of the genera of the order were very indefinite—so much so, that many of the old genera are coextensive with the tribes or subtribes I have adopted in the rearrangement of the order. Indeed, the old genus *Ruellia* is equivalent to my Suborder *Ruellideæ*. Only five genera of *Acanthaceæ* are described in the 4th edition of the 'Genera Plantarum,' published in 1752, and, with the exception of *Thunbergia*, a genus of later date than 1752, these are the only genera recognized in Linnæus's Herbarium. The number of species is 67, distributed among the genera as follows:—*Thunbergia* 1, *Ruellia* 18, *Barleria* 9, *Acanthus* 11, *Justicia* 26, *Dianthera* 2.

There are, among these 67 species, representatives of 28 genera, according to the views I entertain of the limits of genera in this order; and many more, as will appear from the synonymy, if Nees von Esenbeck's opinions are adopted as he has stated them in the 11th volume of the 'Prodromus.'

The following list includes all the species referred to genera of *Acanthaceæ* by Linnæus, and specimens of which exist in his Herbarium. In preparing it for comparison, I have taken the names appended to the specimens by Linnæus as the basis of the arrangement, but in the sequence of the genera I have adopted my own arrangement. In the case of the Linnean names, I have quoted the work in which the species was first described. The name I adopt is then given.

A considerable array of synonymy occurs with some of the species; this is rendered necessary by my having quoted all those species of Nees von Esenbeck which I consider identical.

THUNBERGIA, *Linn. fil.*

1. T. CAPENSIS, Thunb. Nov. Plant. Gen. p. 21. *T. Capensis*, N. ab E. in DC. Prodr. xi. p. 55, et mihi.—This plant bears the name of *Solandra Capensis* in Linnæus's Herbarium.

RUELLIA, *Linn.*

1. R. BLECHUM, Linn. in Amœn. Acad. v. p. 400. *Blechum Brownei*, Juss. Ann. du Mus. ix. p. 270; N. ab E. l. c. p. 466, et mihi.—I refer Nees von Esenbeck's *B. Trinitense* and *B. Haenkei* to this species.

There is a second specimen in the Linnean Herbarium which is also called *R. Blechum*; it is probably an *Aphelandra*, but the species is not determinable.

2. R. CLANDESTINA, Linn. Sp. Pl. ed. 1753, ii. p. 634. *R. clandestina*, mihi. *Cryphiacanthus Barbadensis*, N. ab E. l. c. p. 197.—Nees von Esenbeck, at p. 156 of the 11th volume of the 'Prodromus,' gives *Cryphiacanthus clandestinus* as the name he adopts for Linnæus's *R. clandestina*, but that specific term does not occur among his species of *Cryphiacanthus*.

3. R. PANICULATA, Linn. Sp. Pl. ed. 1753, ii. p. 635. *R. paniculata*, mihi. *Dipteracanthus paniculatus*, N. ab E. l. c. p. 142.

4. R. TUBEROSA, Linn. Sp. Pl. ed. 1753, ii. p. 635. *R. tuberosa*, mihi. *Cryphiacanthus Barbadensis*, N. ab E. l. c. p. 197.—As appears by the synonymy, Nees von Esenbeck unites *R. clandestina* and *R. tuberosa*, Linn. Linnæus's specimens are certainly very distinct.

5. R. TENTACULA, Linn. in Amœn. Acad. iv. p. 320. *Haplanthus tentaculus*, N. ab E. l. c. p. 513, et mihi.

6. R. BIFLORA, Linn. Sp. Pl. ed. 1753, ii. p. 635, is an American species of *Calophanes*, but the specimen is too imperfect for identification. Nees von Esenbeck refers this to his *Calophanes oblongifolius*, DC. Prod. xi. p. 107.

7. R. CRISPA, Linn. Sp. Pl. ed. 1764, ii. p. 886. *Hemiagraphis crispa*, mihi.—*R. crispa*, N. ab E., is quite distinct from Linnæus's species, though Nees considers them identical. I have seen Nees von Esenbeck's species in Wight's Herbarium; it belongs to the small blue-flowered section of my remodelled genus *Hemiagraphis*. That section is very distinct from the yellow-flowered Strobilanthoid division of the genus, which contains species that are nearly all Eastern Asiatic or Malayan in their distribution, and may require to be separated generically from the blue-flowered Indian species.

8. R. REPANDA, Linn. Sp. Pl. ed. 1764, ii. p. 886. *R. repanda*, N. ab E. l. c. p. 144, et mihi.

9. R. RINGENS, Linn. Sp. Pl. ed. 1753, ii. p. 635. *Hygrophila salicifolia*, N. ab E. l. c. p. 92, et mihi.—This identification confirms Robert Brown's remark in the 'Prodromus Floræ Novæ Hollandiæ,' p. 479, under *Hygrophila angustifolia*. He says, "hujus congener et valde affinis est *Ruellia ringens*, Osb. et Linn. Sp. Pl. exclus. syn. Floræ Zeylanicæ et Rheed. Mal." The plant referred to by Linnæus in these works is probably *Ruellia prostrata*, Poir. Rheede's figure is not x. t. 64, as cited by Linnæus in the 'Flora Zeylanica' and the 'Species Plantarum,' but ix. t. 64.

10. R. ANTIPODA, Linn. Sp. Pl. ed. 1753, ii. p. 635, is *Bonnaya veronicæfolia*, Spreng.

11. R. REPENS, Linn. Mant. p. 89. *R. repens*, mihi. *Dipteracanthus lanceolatus*, N. ab E. l. c. p. 124.

12. R. LITTORALIS, Linn. Suppl. p. 289. *Calophanes littoralis*, T. Anders. in Thw. En. Pl. Zeyl. p. 225. *Dyschoriste littoralis*, N. ab E. l. c. p. 106.

13. R. DIFFORMIS, Linn. fil. Suppl. p. 299. *Adenosma triflora*, N. ab E. l. c. p. 68, et mihi.—Blume in the 'Bijdragen,' p. 804, refers this to his *Hygrophila difformis*. I have not seen Blume's plant, but it is probably a form of *Hygrophila salicifolia*.

14. R. BALSAMICA, Linn. Suppl. p. 289. *Adenosma balsamea*, Spr. Syst. ii. p. 829, et T. Anders. in Thw. En. Pl. Zeyl. p. 224.—The specific name is written "*balsamica*" in Linnæus's Herbarium.

15. R. ULIGINOSA, Linn. Suppl. p. 290. *Adenosma uliginosa*, N. ab E. in Wall. Pl. As. Rar. iii. p. 79, et DC. Prodr. xi. p. 69, et T. Anders. in Thw. En. Pl. Zeyl. p. 224.—Robert Brown in the 'Prodromus Fl. Nov. Holl.' can hardly be quoted as the authority for the species of *Adenosma*, as all the species indicated by him as belonging to it have been removed to *Scrophularineæ*.

16. R. PILOSA, Linn. Suppl. p. 290. *R. pilosa*, T. Anders. in Enum. Acanth. Afric. in Journ. Proc. Linn. Soc. vii. p. 25. *Fabria pilosa*, N. ab E. l. c. p. 114.—The species, however, in the Linnean Herbarium is by some error represented by what is evidently a species of *Antirrhinum*.

17. R. ALTERNATA, Burm. Fl. Ind. p. 135. *Hemiagraphis alternata*, mihi. *R. Blumeana*, et forsan *R. discolor*, N. ab E. l. c. p. 149.

18. *R.* species is *Stenandrium Pohlii*, N. ab E. l. c. p. 283, et mihi.

Two specimens included in the generic envelope of *Ruellia* in the Linnean Herbarium do not belong to the order Acanthaceæ; one is a species of *Phlox*, and the other is not determinable. A specimen marked "*Ruellia sp.* Linn. fil." is a species of *Phlox*; besides, there is a specimen of a *Ruellia* from North America in too imperfect a condition for identification.

BARLERIA, *Linn.*

1. B. LONGIFOLIA, Linn. in Amœn. Acad. iv. p. 320. *Hygrophila spinosa*, T. Anders. in Thw. En. Pl. Zeyl. p. 225. *Asteracantha longifolia*, N. ab E. l. c. p. 247.

2. B. HYSTRIX, Linn. Mant. p. 89. *B. Prionitis*, Linn. Sp. Pl. ed. 1753, p. 636, et T. Anders. in Thw. En. Pl. Zeyl. p. 230. *B. Hystrix*, N. ab E. l. c. p. 239.

3. B. PRIONITIS, Linn. Sp. Pl. ed. 1753, p. 636. *B. Prionitis*, N. ab E. l. c. p. 237, et T. Anders. l. c.

4. B. BUXIFOLIA, Linn. Sp. Pl. ed. 1753, p. 636. *B. buxifolia*, N. ab E. l. c. p. 241, et mihi.—The specimen is marked from Ceylon. I have seen no other specimens from Ceylon. See note appended to this species at page 231 of Thwaites's Enum. Plant. Zeylan.

5. B. NOCTIFLORA, Linn. Suppl. p. 290. *B. noctiflora*, N. ab E. l. c. p. 239, et mihi.

6. B. CRISTATA, Linn. Sp. Pl. ed. 1753, p. 636. *B. cristata*, N. ab E. l. c. p. 229, et T. Anders. in Thw. En. Pl. Zeyl. p. 230.—In Thwaites's Enumeratio Plant. Zeyl. I have placed *B. dichotoma* and *B. ciliata* of Roxburgh, as well as *B. Nepalensis* of Nees von Esenbeck, as synonyms of this species.

7. B. INDICA.—This seems to be an unpublished name; the specimen bearing it is *B. cristata*.

8. B. PUNGENS, Linn. Suppl. p. 290. *B. pungens*, N. ab E. l. c. p. 236, et mihi.

9. B. SERICEA.—*B. longiflora* is written in pencil on the sheet, and that is also the name under which the species was first published in the Supplement, p. 290. *B. longiflora*, N. ab E. l. c. p. 235, et mihi.

ACANTHUS, *Linn.*

1. A. MOLLIS, Linn. Sp. Pl. ed. 1753, p. 639. *A. mollis*, N. ab E. l. c. p. 270, et mihi.

2. A. CARDUIFOLIUS, Linn. Suppl. p. 294. *Blepharis carduifolia*, T. Anders. in Enum. Acanth. Afric. in Journ. Proc. Linn. Soc. vii. p. 35. *Acanthodium carduifolium*, N. ab E. l. c. p. 278.

3. A. SPINOSUS, Linn. Sp. Pl. ed. 1753, p. 639. *A. spinosus*, N. ab E. l. c. p. 271, et mihi.

4. A. ILICIFOLIUS, Linn. Sp. Pl. ed. 1753, p. 639. *A. ilicifolius*, T. Anders. in Thw. En. Pl. Zeyl. p. 232. *Dilivaria ilicifolia*, (Juss.) N. ab E. l. c. p. 268.

5. A. MADERASPATANUS, Linn. MSS. in Herb. *Blepharis molluginifolia*, (Juss.) N. ab E. l. c. p. 266, et T. Anders. in Thw. En. Pl. Zeyl. p. 231.—I am obliged to cite the Linnean specimen of this species in the manner I have done, because the name, though evidently suppressed on the sheet and transferred to Jussieu's *B. Boerhaaviæfolia*, has had no other substituted for it by Linnæus.

6. A. FURCATUS, Linn. Suppl. p. 295. *Blepharis furcata*, T. Anders. in Enum. Acanth. Afric. in Journ. Proc. Linn. Soc. vii. p. 35. *Acanthodium furcatum* et *A. macrum*, N. ab E. l. c. p. 276.

7. A. Capensis, Linn. Suppl. p. 295. *Blepharis Capensis*, Pers. Syn. ii. p. 180, et mihi. *Acanthodium Capense*, N. ab E. l. c. p. 276.

8. A. Maderaspatensis, Linn. Sp. Pl. ed. 1753, p. 639. *Blepharis Boerhaaviæfolia*, Juss., N. ab E. l. c. p. 266, et T. Anders. in Thw. En. Pl. Zeyl. p. 231.

9. A. Maderaspatensis (?) is *Blepharis edulis*, Pers. Syn. ii. p. 180, et mihi. *Acanthodium spicatum*, (Delile) N. ab E. l. c. p. 274.

10. A specimen marked "A. 1." is *Hygrophila spinosa*, T. Anders. in Thw. En. Pl. Zeyl. p. 225. *Asteracantha longifolia*, N. ab E. l. c. p. 247.

11. "*Acanthus* ex Cap. Bon. Spei" is *Sclerochiton Harveyanus*, N. ab E. l. c. p. 279, et mihi.

Justicia, *Linn.*

1. J. Adhatoda, Linn. Sp. Pl. ed. 1753, p. 15. *J. Adhatoda*, (Linn.) T. Anders. in Thw. En. Pl. Zeyl. p. 233. *Adhatoda Vasica*, N. ab E. l. c. p. 387.

2. J. Ecbolium, Linn. Sp. Pl. ed. 1753, p. 15. *Eranthemum Ecbolium*, T. Anders. in Thw. En. Pl. Zeyl. p. 235. *J. Ecbolium*, N. ab E. l. c. p. 426. *J. gymnostachya*, N. ab E. l. c. *J. lætevirens*, (Vahl) N. ab E. l. c. p. 427. *J. strobilifera*, (Lam.) N. ab E. l. c. *J. emarginata*, N. ab E. l. c. *J. rotundifolia*, N. ab E. l. c. *J. syringifolia*, (Vahl) N. ab E. l. c. *J. livida*, (Wall.) N. ab E. l. c. *J. dentata*, (Klein) N. ab E. l. c. —Linnæus's specimen of this species is a cultivated one from the Upsal Botanic Garden.

3. J. Ecbolium, Linn. (No. 2.)—This is probably *Aphelandra tetragona*, N. ab E. l. c. p. 295, but the specimen is too imperfect for specific identification.

4. J. pulcherrima, Linn. Suppl. p. 84. *Aphelandra pulcherrima*, (H. B. K.) N. ab E. l. c. p. 295, et mihi.

5. J. picta, Linn. Sp. Pl. ed. 1762, p. 21. *Graptophyllum hortense*, N. ab E. l. c. p. 328, et mihi.

6. J. infundibuliformis, Linn. Sp. Pl. ed. 1762, p. 21. *Crossandra infundibuliformis*, N. ab E. l. c. p. 280, et mihi.—*C. axillaris* et *C. oppositifolia*, N. ab E., cannot be considered good species; I therefore include them under *C. infundibuliformis*.

7. J. fastuosa, Linn. Mant. p. 172. *Hypoestes fastuosa*, (Soland.) N. ab E. l. c. p. 507, et mihi.

8. J. Gendarussa, Linn. Suppl. p. 85. *J. Gendarussa*, T. Anders. in Thw. En. Pl. Zeyl. p. 233. *Gendarussa vulgaris*, N. ab E. l. c. p. 410.

9. J. TRANQUEBARIENSIS, Linn. Suppl. p. 85. *J. Tranquebariensis,* mihi. *Adhatoda Tranquebariensis,* N. ab E. l. c. p. 399.

10. J. HYSSOPIFOLIA, Linn. Sp. Pl. ed. 1753, p. 15. *J. hyssopifolia,* (Linn.) T. Anders. in Enum. Acanth. Afric. in Journ. Proc. Linn. Soc. vii. p. 41. *Adhatoda hyssopifolia,* N. ab E. l. c. p. 392.—Nees von Esenbeck has confused *J. hyssopifolia* and *J. cuneata,* Vahl (*Adhatoda,* N. ab E.), and has therefore cited some of the specimens of *J. cuneata,* a truly Cape of Good Hope species, under the name *J. hyssopifolia. J. hyssopifolia* has not been found on the continent of Africa.

11. J. ACAULIS, Linn. Suppl. p. 84. *Elytraria crenata,* (Vahl) N. ab E. l. c. p. 63, et mihi.—Palisot de Beauvais's West African species, *E. marginata,* and the North American *E. virgata,* N. ab E., with the synonymy quoted by Nees, both belong to this species, for which I retain Vahl's specific name.

12. J. CILIARIS, Linn. Suppl. p. 84. *Schwabea ciliaris,* N. ab E. l. c. p. 384, et T. Anders. in Enum. Acanth. Afric. in Journ. Proc. Linn. Soc. vii. p. 45.

13. J. PROCUMBENS, Linn. Fl. Zeyl. p. 7. *J.* (sect. *Rostellaria*) *procumbens,* (Linn.) mihi. *Rostellaria procumbens,* N. ab E. l. c. p. 371. *R. rotundifolia,* N. ab E. l. c. p. 370. *R. Abyssinica,* (Brongn.) N. ab E. l. c. p. 372. *R. mollissima,* N. ab E. l. c. p. 373. *R. Royeniana,* N. ab E. l. c. *R. crinita,* N. ab E. l. c.

14. J. DIFFUSA, Sm. MSS.—This specific name is not in Linnæus's handwriting, but in that of Sir James Smith. The species is *Lepidagathis hyalina,* N. ab E. l. c. p. 252.

15. J. PECTINATA, Linn. Amœn. Acad. iv. p. 299. *Rungia pectinata,* N. ab E. l. c. p. 470, et mihi. *R. parviflora,* N. ab E. l. c. et T. Anders. in Thw. En. Pl. Zeyl. p. 234. *R. polygonoides,* N. ab E. l. c. p. 471. *R. origanoides,* N. ab E. l. c. *R. muralis,* Royle, N. ab E. l. c. p. 470.

16. J. REPENS, Linn. Sp. Pl. ed. 1753, p. 15. *Rungia repens,* N. ab E. l. c. p. 473, et T. Anders. in Thw. En. Pl. Zeyl. p. 235.

17. J. CHINENSIS, Linn. Sp. Pl. ed. 1753, p. 16. *Dicliptera Chinensis,* N. ab E. l. c. p. 477, et mihi. *D. Burmanni,* N. ab E. l. c. p. 83. *D. Roxburghiana,* N. ab E. l. c.

18. J. ECHIOIDES, Linn. Sp. Pl. ed. 1753, p. 16. *Andrographis echioides,* N. ab E. l. c. p. 518, et T. Anders. in Thw. En. Pl. Zeyl. p. 232.

19. J. SEXANGULARIS, Linn. Sp. Pl. ed. 1753, p. 16. *Dicliptera sexangularis,* (Juss.) N. ab E. l. c. p. 479, et mihi.

20. J. ASSURGENS, Linn. Amœn. Acad. v. p. 391. *Dicliptera assurgens,* (Juss.) N. ab E. l. c. p. 489.

21. J. NASUTA, Linn. Sp. Pl. ed. 1753, p. 16. *Rhinacanthus communis*, N. ab E. l. c. p. 442, et T. Anders. in Thw. En. Pl. Zeyl. *R. Rottlerianus*, N. ab E. l. c. p. 443.

22. J. BIVALVIS, Linn. Sp. Pl. ed. 1762, p. 23. *Dicliptera bivalvis*, (Juss.) N. ab E. l. c. p. 475, et T. Anders. in Thw. En. Pl. Zeyl. p. 235.

23. J. PURPUREA, Linn. Sp. Pl. ed. 1753, p. 16. *Hypoestes purpurea*, (R. Br.) N. ab E. l. c. p. 509, et mihi.—This species has not been found in India. Griffith's specimen in the Hookerian Herbarium, quoted by Nees von Esenbeck in the 'Prodromus' as from Assam, is a cultivated specimen from the Calcutta Botanic Garden, into which the plant was introduced from China by Mr. Reeves in 1820. The specimen in the Linnean Herbarium is also from China.

24. J. GANGETICA, Linn. Amœn. Acad. iv. p. 299. *Asystasia Gangetica*, T. Anders. in Thw. En. Pl. Zeyl. p. 235. *A. Coromandeliana*, N. ab E. l. c. p. 165. *A. plumbaginea*, N. ab E. l. c. p. 164. *A. quaterna*, N. ab E. l. c. p. 166. *A. intrusa*, N. ab E. l. c. *A. Bojeriana*, N. ab E. l. c. *A. Comorensis*, (Bojer) N. ab E. l. c. *A. calycina*, Benth. Fl. Nig. p. 478, non N. ab E.—I appended the following note to this species in Thwaites's Enumeratio Plantarum Zeylaniæ, p. 236:—"The extensive distribution of this species over tropical Asia and Africa renders the specific name adopted by Nees von Esenbeck quite inappropriate, and the same objection may be made to the original one given by Linnæus, and which, as being the oldest, I have revived. For so cosmopolitan a plant the specific term *communis* or *vulgaris* would perhaps be more suitable."

25. J. BICALYCULATA, Vahl. This specimen has not a Linnean specific name attached. In the Supplement, p. 85, it is described under the name *Dianthera Malabarica*.

26. A specimen named *J. hyssopifolia*, and on another portion of the sheet having *J. antidota*, written by Sir J. Smith, is *J. Betonica* var. *Neilgherriensis*, mihi; *Adhatoda Nilgherrica*, N. ab E. l. c. p. 386. The *J. hyssopifolia* of the 1st edition of the 'Species Plantarum' is a native of the Canary Islands.

DIANTHERA, *Linn.*

1. D. AMERICANA, Linn. Sp. Pl. ed. 1753, p. 27, is a species of *Rhyttiglossa*, probably the *R. pedunculosa*, N. ab E. l. c. p. 339.

2. D. COMATA, Linn. Sp. Pl. ed. 1762, p. 24. *Leptostachya comata*, N. ab E. l. c. p. 381.

The specimen marked *Eranthemum hyssopifolium* does not belong to the order Acanthaceæ.

On *Anisostichium*, a proposed new Genus of *Musci*.

By WILLIAM MITTEN, A.L.S.

[Read June 18, 1863.]

ANISOSTICHIUM, gen. nov.

Foliis inæqualibus, diversiformibus, uno latere majoribus distichis, altero minoribus stipuliformibus; florescentia terminali fructuque *Weberæ*.

1. A. TOZERI. Foliis tristichis, majoribus patulis verticaliter subplanis, minoribus suberectis lanceolatis ovato-lanceolatisve.

Bryum Tozeri, Greville, Scot. Crypt. Fl. v. t. 285.

Hab. In Britannia Galliaque australi, India orientali temperata, et in insulis Sardiniæ, Madeiræ, et Javæ.

Fig. 3. A sterile stem, magnified.

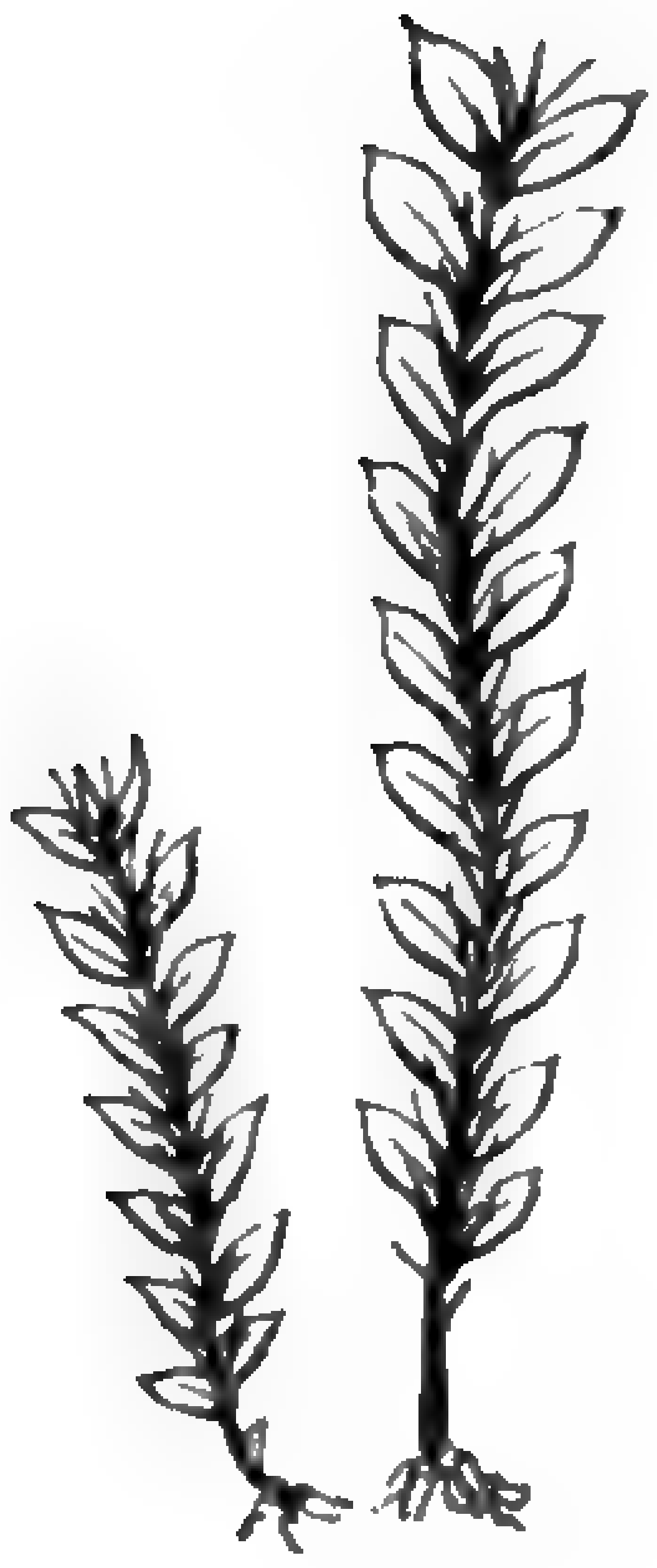


Fig. 1 (A. pictum).

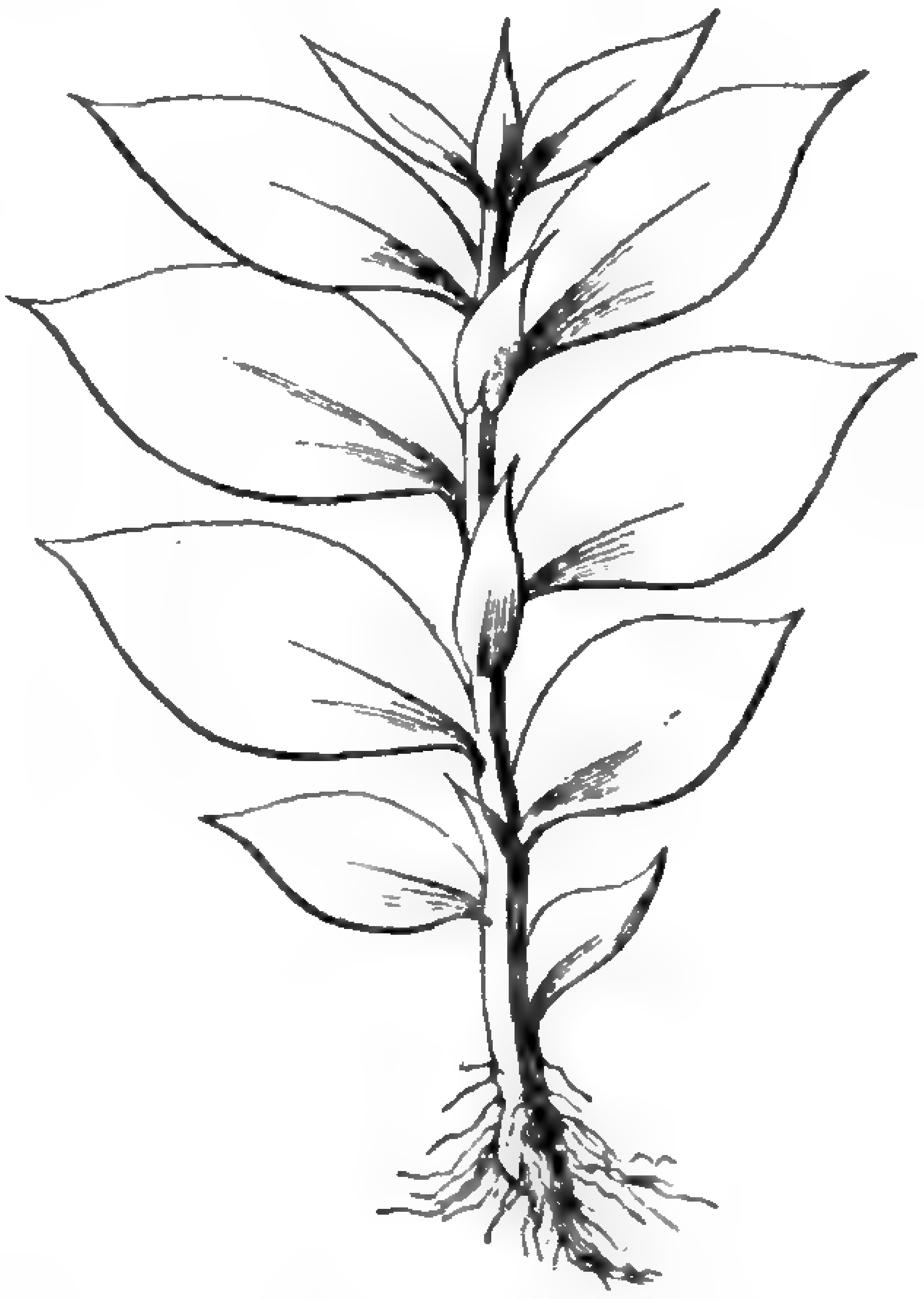


Fig. 3 (A. Tozeri).

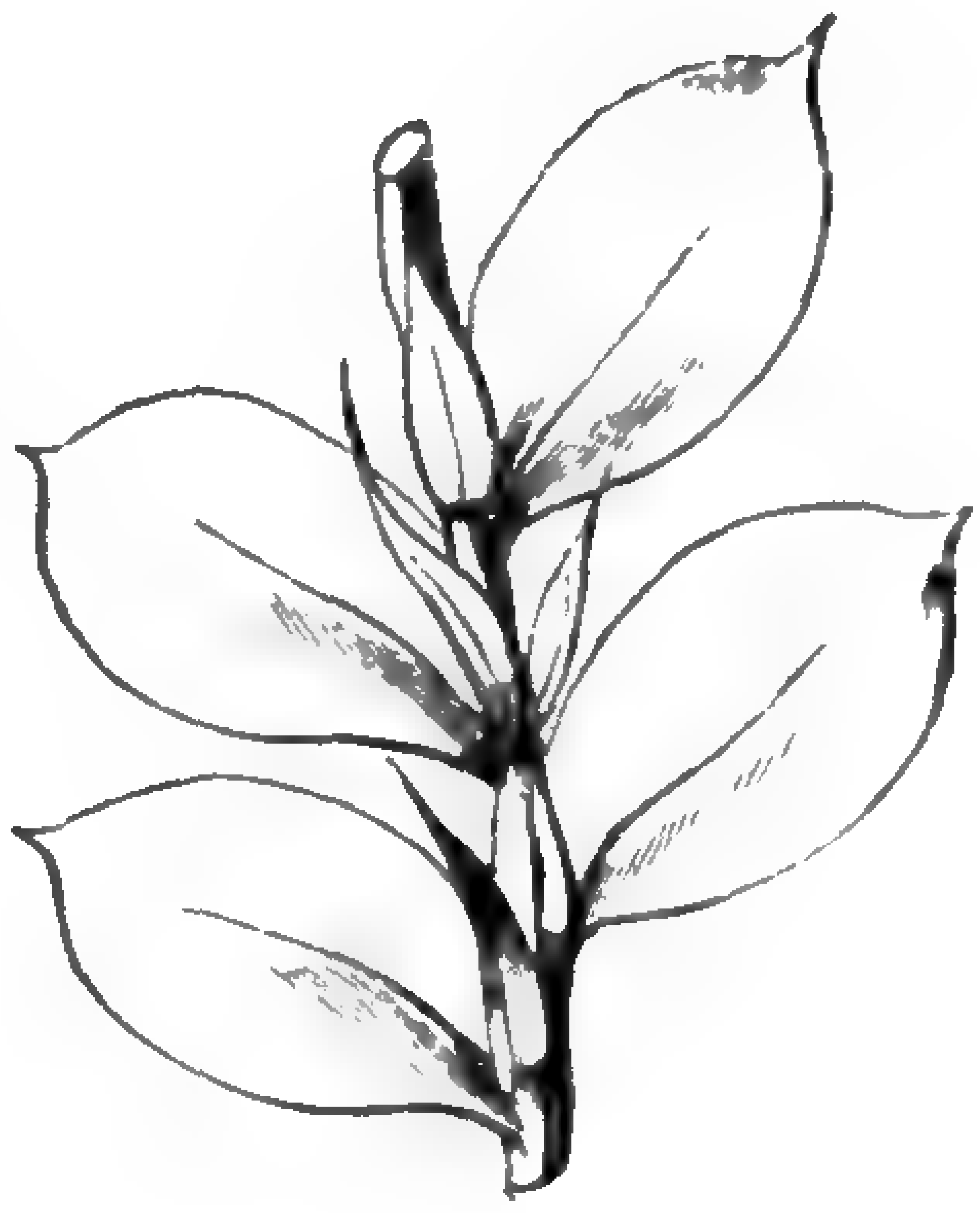


Fig. 2 (A. pictum).

2. A. PICTUM, sp. nov. Caulibus elongatis, foliis majoribus patentibus verticaliter complanatis late obovatis apice apiculatis submarginatis integerrimis nervo infra apicem evanido, minoribus tristichis erectis ovato-lanceolatis nervo breviore cellulis laxis elongatis pellucidis.

Hab. In Jamaica (*Hb. Hooker.*), Veraguas (*Dr. Seemann*), et in America fœderata australiore.

Fig. 1. Stems, of the natural size. Fig. 2. A portion magnified.

Leaves pale green, the older ones as well as the stems becoming beautifully tinged with red. Rudiments of inflorescence are alone observable on the specimens from Jamaica, and these occur on stems having the same arrangement of leaves as in those which are barren. In *A. Tozeri* the leaves of the fertile stems show but indistinctly the tristichous arrangement sufficiently evident in the sterile.

This genus occupies a place in the group of Mosses which correspond in areolation and fructification with *Bryum*, and constitute the tribe *Bryaceæ*; it is closely allied to *Webera*, with which its fruit agrees; but it differs from all other genera yet known to belong to that group in the same manner as *Calomnion* does from *Hymenodon* and other *Mniaceæ*. If the arrangement of the leaves alone was a sufficient character to form a genus, *Anisostichium Tozeri* would exactly correspond with *Calomnion*; but the areolation of the latter is composed of rounded hexagonal cells, and is precisely that of *Rhizogonium*, which so closely simulates the forms of *Mnium*, that they must all be referred to the same natural group—*Mniaceæ*. The analogy of form is carried still further in *Mniopsis*, which has barren and fertile stems with their leaves disposed as in corresponding stems of *Schistostega*; but the areolation is distinctly Mnioid, whilst *Schistostega* has the areolation observable in *Anisostichium* and *Webera*, and thus is more nearly allied to them, and belongs to the *Bryaceæ*,—there being no connecting link between it and the *Splachnaceæ*, to which Schimper, although instituting for its reception his family *Schistostegeæ*, is inclined to refer it.

On the Ink-plant of New Granada (*Coriaria thymifolia*). By Dr. WILLIAM JAMESON, of Quito; in a Letter to I. A. HENRY, Esq. (Communicated by J. D. HOOKER, M.D., F.R. & L.S.)

[Read June 18, 1863.]

"Quito, April 11, 1863.

"I AM anxious to have Dr. Hooker's opinion of the 'Ink-plant.' There is a tradition here respecting this vegetable juice that merits attention. It happened, during the Spanish Administration, that a number of written documents, destined to the mother country, were embarked in a vessel, and transmitted round the Cape. The voyage was unusually tempestuous, and the documents got wetted with salt water. Those written with common ink became nearly illegible, whereas those written with 'Chauchi' (the name of the juice) remained unaltered. A decree was thereupon issued that the Government communications should in future be written with the vegetable juice....I do not vouch for the correctness of this statement, but I have constantly heard it repeated from different sources. I generally use this ink in preference to the commercial article, as it is not so apt to corrode the steel pen. The present note is written with it, and has no admixture whatever, being only yesterday expressed from the fruit. When newly written, its colour is reddish, becoming black after a few hours."

A Description of some remarkable Malformations affecting the Genus *Lolium*. By MAXWELL T. MASTERS, M.D., F.L.S., Lecturer on Botany, St. George's Hospital.

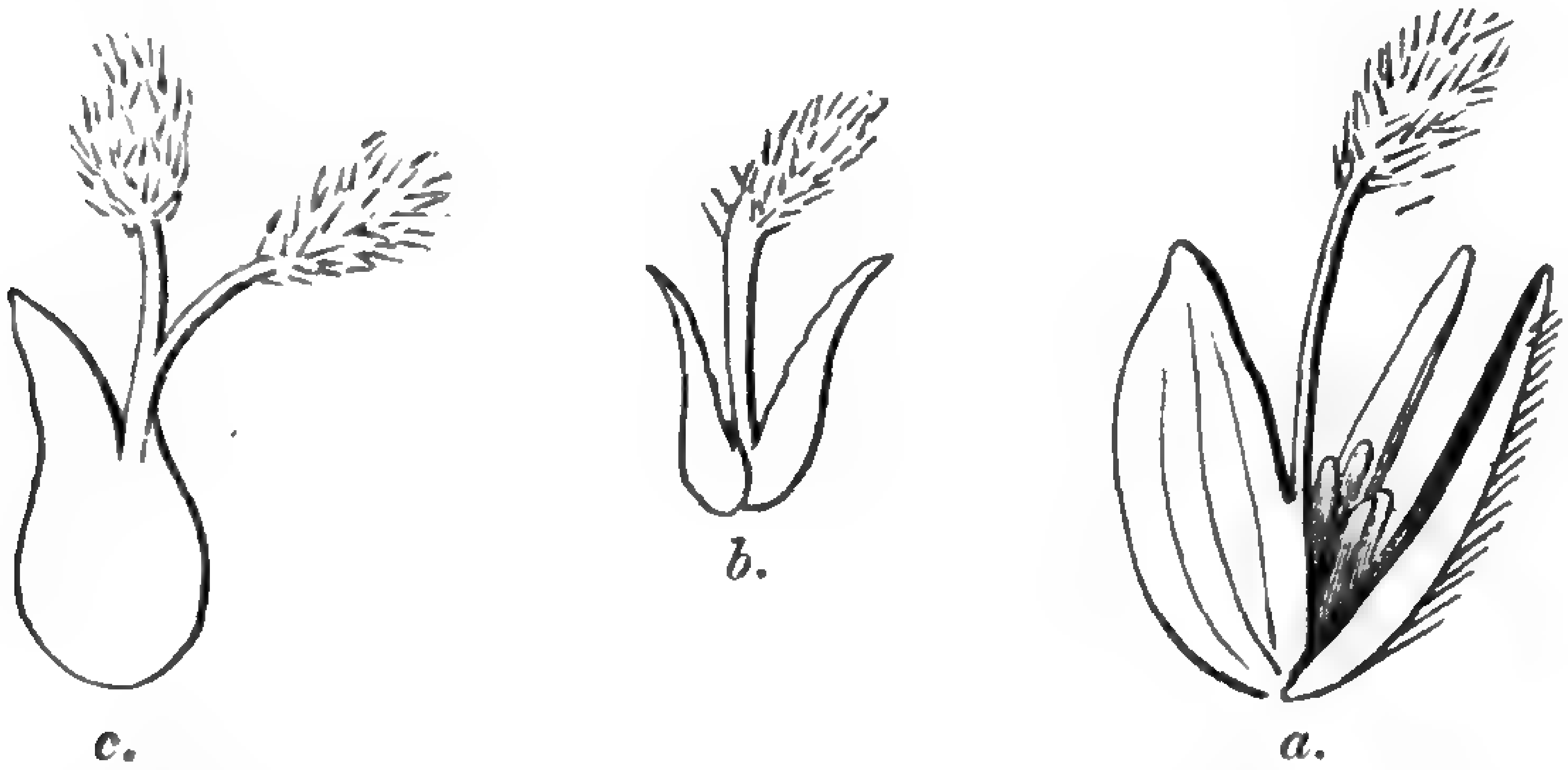
[Read March 19, 1863.]

IN the volume of the Bull. Soc. Bot. Fr. for the year 1858, p. 85, M. Fournier has described four varieties of *Lolium perenne* as of common occurrence, and in a paper in Seemann's Journal of Botany, vol. i. p. 6, I have mentioned certain others. The specimens I have now the honour of laying before the Society must be classed under the head of Deformities rather than that of Varieties.

The simplest of the changes now to be mentioned consists merely in the lengthening of the axis of the spikelet, in consequence of which, the constituent florets are separated by much longer intervals than usual. In some examples of this, the axis is not merely lengthened, but becomes very flexuose, while the outermost glume only just exceeds the lowermost floret in length, and is very short in proportion to the length of the spikelet; hence the aspect of the plant is very different from that of the natural form. This change may occur independently of any other; but I have most frequently met with it in the branched variety, common under the several names of *L. perenne compositum, paniculatum*, or *ramosum*. Usually only a few of the spikelets are so affected; but in the plant now shown all the spikelets are thus changed.

In another series of specimens I have met with the following changes:—The spikelets have assumed more of a rounded outline than usual, and are shorter than the outer glume. The number of florets is in general reduced to three, in each of which, or sometimes in the lower one only, considerable changes have taken place. The paleæ are for the most part unchanged; but in some of the spikelets the inner palea is placed opposite to the outer one, and on the same level with it, while in others the inner palea is split into two, thus rendering the symmetry of the whorl complete (fig. 1, *a*). Within the paleæ, in place of the stamens and pistils is a confused mass, consisting of numerous scales, the outermost of which resemble paleæ, and are frequently more or less recurved or hooklike at their points; the inner ones are smaller, and either merely white and membranous like the ordinary lodicles, or they exhibit various intermediate stages between the state of scales and that of feathery stigmata (fig. 1, *b*, *c*). I have not been enabled to discover, in any of the very numerous specimens examined, the slightest trace either of stamens or of ovules.

Fig. 1.



a. Floret showing outer palea partially stigmatic; inner palea partly divided into two, and enclosing a number of scales. *b*, *c*. Inner scales from florets, showing tendency to assume appearance of the pistil.

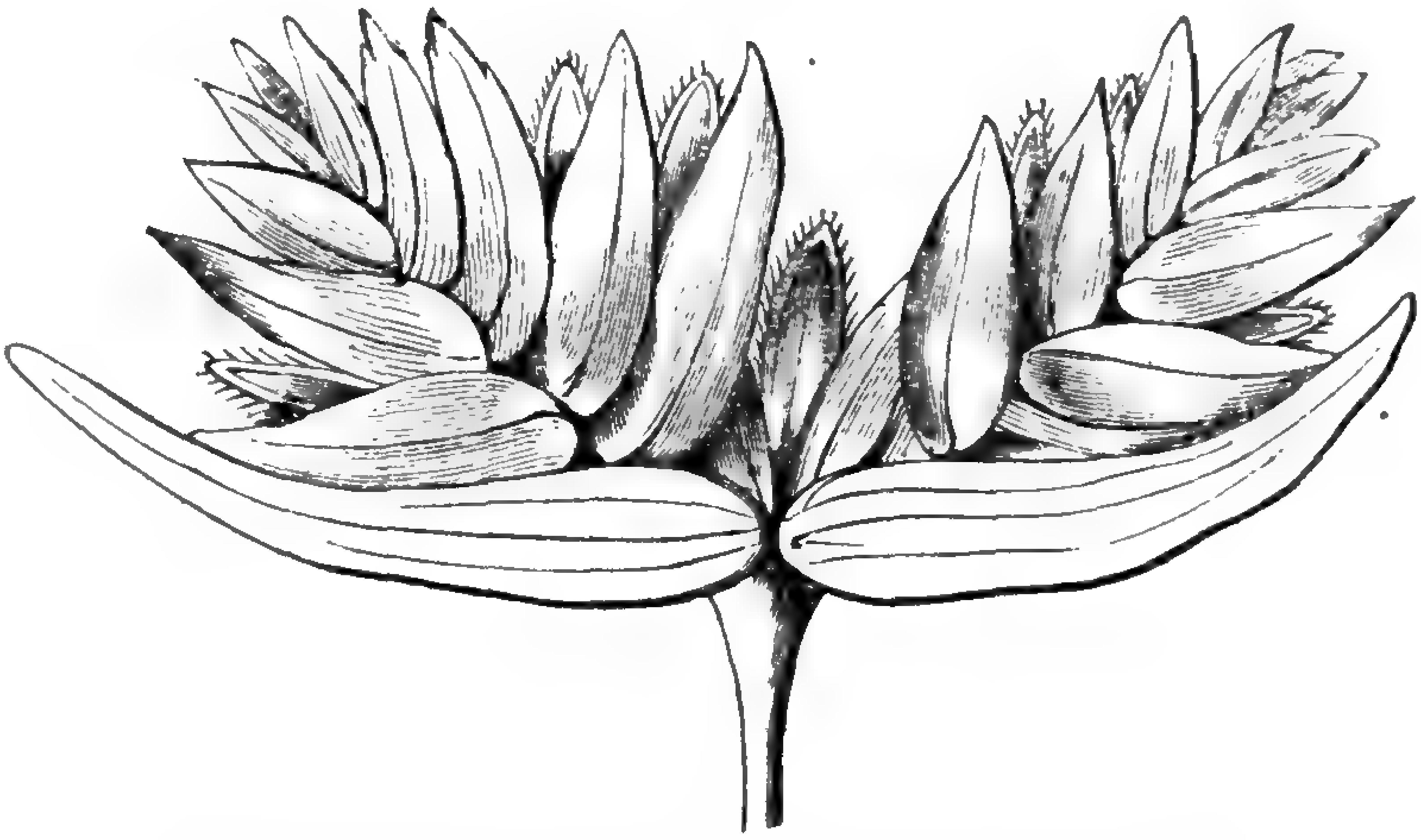
To sum up the peculiarities afforded by these specimens, it may be said that they present a diminished number of florets, an alteration in the form of the spikelet, a change in the number and disposition of the paleæ, a partial chloranthic condition of the inner constituents of the florets, a multiplication of these constituents, and a tendency in them to assume the nature of the pistil.

In a third series of specimens the changes that have taken place are yet more grave and singular. In the lower part of the spike the spikelets are of the ordinary form, and are arranged singly and alternately on the sides of the grooved rachis; but towards the upper part of the spike a change in the disposition takes place, and the spikelets become arranged in pairs on each notch of the rachis, as they are in *Elymus* or *Hordeum*, the pairs being arranged alternately as usual, but in four or more rows instead of in two.

The spikelets themselves are more or less spherical in form, each has an outer and inner glume of the ordinary aspect, and is made up of a number of florets arranged, not in two rows, but in several, and, owing to the shortening of the rachis of the spikelet, they are densely tufted. So closely are the florets crowded, that in many instances a fusion of the outer paleæ of two contiguous florets has taken place. This double palea shows eleven ribs, five on each half, and a central one in the line of fusion.

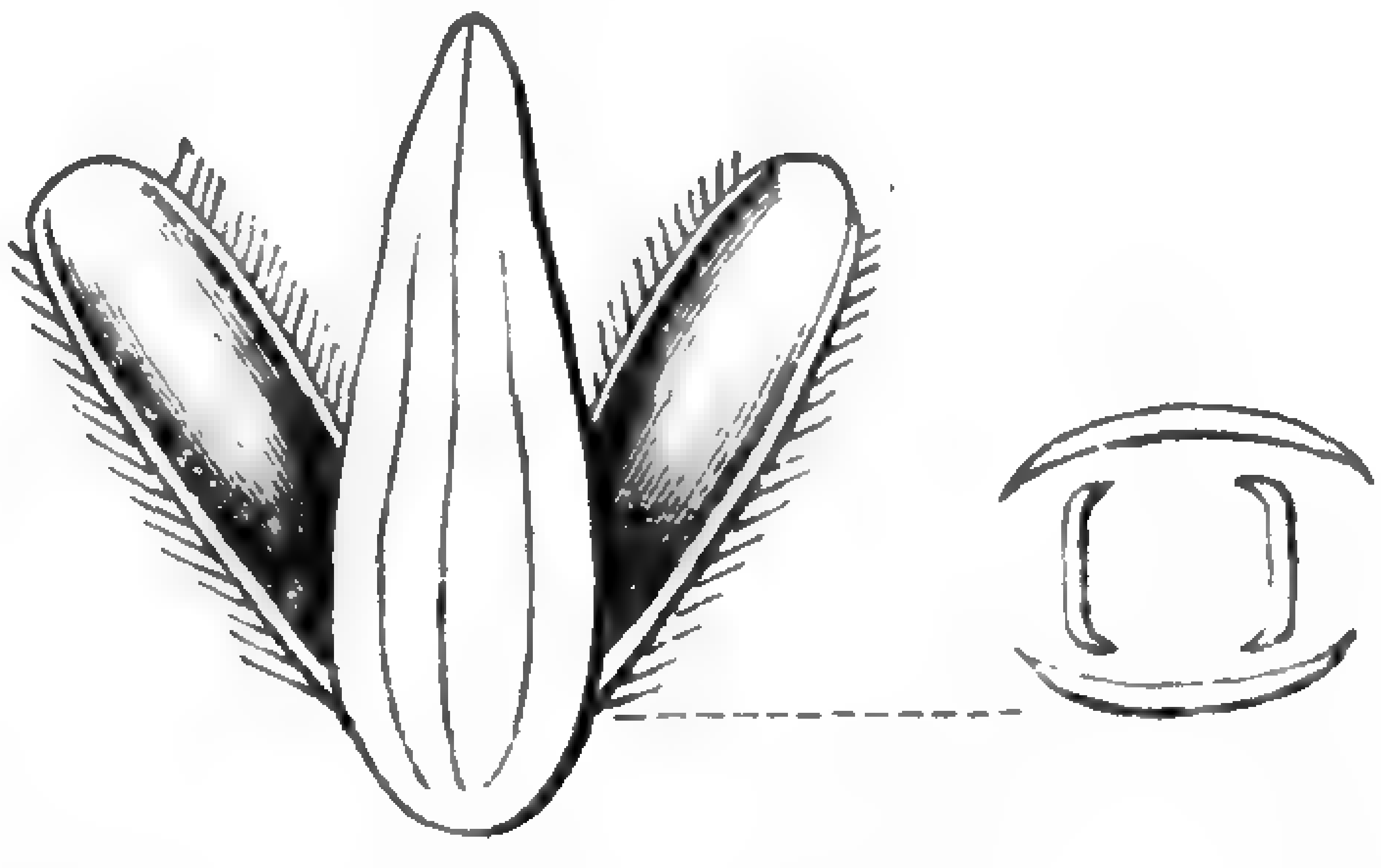
The union sometimes extends also to the inner paleæ; and in one case the inner pales of three florets were united together. Within the paleæ may here and there be found a perfect flower; but more usually there are a number of scales, the outer ones palea-like, often twisted spirally, and hooked at the summit; the succeeding ones exhibit various intermediate conditions between that of palea and that of stamens, while the central ones are merely rudimentary scales. The lodicles are not distinguishable from these latter; and, contrary to what happens in the second series of specimens now described, in the present instance there is no trace of pistil, except in the case immediately to be described. In addition to the changes just mentioned, the axis of the spikelet just within the outer glumes occasionally divides into two diverging branches, each bearing its tuft of florets (fig. 2). In the fork between the two branches is placed in some, but not in all, a single floret, which thus terminates the main axis of the spikelet, after the fashion followed in a dichotomous cyme. The component parts of this floret are arranged after a different method from the ordinary one (fig. 2 *a*). The outer whorl consists

Fig. 2.



Branching of axis of spikelet within the outer glumes.

Fig. 2 *a*.



Central, terminal floret, and plan of the same.

of two paleæ, placed directly opposite one another, and quite resembling in form and appearance the ordinary outer palea. Within these, and at right angles to them, are two more segments, precisely resembling the inner paleæ of the natural flower; within these, again, are a number of thin membranous scales, some of them having more or less of the appearance of the stigmata.

Thus in these very curious specimens the following changes, or some of them, may be observed:—

1st. An alteration in the form of the spikelets, whereby they become spheroidal.

2ndly. Their arrangement in pairs instead of singly on each notch of the rachis, and also in more than two vertical rows.

3rdly. The disposition of the florets in close tufts or whorls; in consequence of which, 4thly, the outer and inner paleæ become more or less fused together.

5thly. Multiplication of the inner portions of these florets, and their presence in the form of scales, exhibiting transitional stages between the scales and stamens.

6thly. Bifurcation of the axis of the spikelet; and, 7thly, the occasional presence of a floret of peculiar construction in the angle of divergence of the two branches.

Account of the Botanical Collections made by David Lyall, M.D., R.N., F.L.S., Surgeon and Naturalist to the North American Boundary Commission.

[Read June 18, 1863.]

The plants upon which the following observations were made, and of which a complete systematic catalogue is appended, were collected in the years 1858–1861, during which period I was, firstly, Surgeon of H.M. Surveying-ship 'Plumper,' and afterwards Surgeon and Naturalist to the Commission appointed to mark out the boundary-line between the British Possessions and those of the United States of America, to the westward of the Rocky Mountains.

The dried plants were transmitted from time to time, as collected and preserved, to Sir William Hooker, at the Royal Gardens at Kew. Of these, the earlier collections were provisionally arranged and catalogued soon after their arrival by Mr. Black, the Curator of the Herbarium; my later and more extensive collections, together with those that followed me to England, were retained intact until such time as I should receive authority from Her Majesty's Government to complete the arrangement of the whole and prepare the accompanying report upon the botanical results of the Boundary Commission.

The necessary arrangements having been made which enabled me to repair to Kew, I immediately commenced the sorting and ticketing of the specimens in all the collections, previous to throwing them together into one complete classified Herbarium and comparing them with the rich North American Herbarium of Sir William Hooker, which, from its containing the plants of every previous explorer of British North America, named in accordance with that celebrated botanist's 'Flora Boreali-Americana,' offered facilities for such a comparison that no other botanical establishment possesses.

The collections having been accurately and, indeed, authentically named, and a complete set laid into the Hookerian Herbarium, I distributed the duplicates to various public museums and botanists in Europe and North America, as well as India and Australia—those having been selected in which (according to the authorities at Kew) they would be most beneficial to science. In doing this, I attached to every specimen a ticket, bearing the same name, locality, &c., as that attached to the specimens retained in the Herbarium at Kew. This done, I drew up the report as follows.

The collections contained 1375 species, of which upwards of 6700 specimens were distributed, not including in the number of the latter the Algæ, Mosses, Hepaticæ, or Lichens. Of the latter order sixty sets are made up, ready for distribution. The others were made up into sets as far as the duplicates of each species would allow, and sent to the following Herbaria:—

Dr. Asa Gray, Cambridge University, Massachusetts.
Musée d'Histoire Naturelle, Paris.
Royal Herbarium, Berlin.
Herbarium, Botanical Gardens, St. Petersburg.
Imperial Herbarium, Vienna.
Professor N. J. Anderson, Stockholm.
Professor Grisebach, Göttingen.
Herbarium, Trinity College, Dublin.
M. Boissier, Geneva.
Royal Herbarium, Leyden.
Professor Bungé, Dorpat.
Dr. Lindley, F.R.S.
John Ball, Esq., F.R.S.
Royal Herbarium, Calcutta.
Royal Herbarium, Munich.
Professor Fries, Upsal.
Professor O. Heer, Zurich.
Dr. Mueller, F.R.S., Melbourne.

This appears to me to be the proper place in which to record the obligations which Sir William Hooker has conferred, in his public capacity, upon science, and, in a private one, upon myself, for whatever value the results of my labours may possess. The attachment of a botanist to the Boundary Commission was due to his powerful representations to Her Majesty's Government; and I owe my own appointment to that office to his friendship and the kind offices of Admiral Washington, the Hydrographer of the Admiralty.

During the whole progress of the expedition I was honoured and stimulated by Sir William's encouraging correspondence, and on my return he allowed me the free use of the noble Herbarium at Kew for the purposes above detailed.

During the time that I was employed at Kew, and indeed previous to that, as far as regards the classification of my earlier collections, I received the most cordial and essential aid from Mr. A. Black, A.L.S., Curator of the Herbarium, but for whose extensive knowledge of American botany and its literature, and intimate acquaintance with the plants in the Herbarium, I could not have named my collections with that accuracy which, thanks to his exertions, may now be confidently claimed for them.

To my old friend Professor Harvey, F.R.S., of Dublin, the distinguished Algologist, I am indebted for the examination and description of the Algæ, an account of which will be found in the 6th volume of the Linnean Society's Journal.

I have been fortunate in securing the services of Mr. William Mitten, A.L.S., in the arrangement and naming of my extensive collections of Mosses, Hepaticæ, and Lichens, which thus have the value of being named by one of the most able and assiduous Cryptogamists in England. Mr. Mitten further intends to draw up an account of them for publication.

A large collection of Fungi was formed, and preserved principally in saline solution. These, it was hoped, would have enabled some botanist in that obscure and difficult department to have thrown some light on the species of North-west America; but the Rev. M. J. Berkeley, F.L.S., to whom they were submitted, states that they have had their distinctive features so much altered as to render them unfit for description.

I should be ungrateful did I omit to mention here also how much indebted I am for the kind support which I received from Lieut.-Col. Hawkins, R.E., Her Majesty's Boundary Commissioner, throughout the expedition *, as well as from my old friend Captain G. H. Richards, R.N., of Her Majesty's Surveying-ship the 'Plumper,' during the few months that I had the pleasure of serving on board that vessel.

The summer of 1858 was spent partly on board the 'Plumper,' at the south-east corner of Vancouver Island and amongst the islands in the Gulf of Georgia, and partly with a detachment of men belonging to the Boundary Commission in the Fraser River Valley, west of the Cascade Mountains, and a little more than twenty miles from the sea.

The summer of 1859 was passed in the same localities as above mentioned, and on the western slope of the Cascade Mountains, close to the 49th parallel.

In May 1860 the Columbia River was entered, and in that season collections were made on both sides of the river, from the Dalles (where our party was divided into two) up to the 49th parallel, and from the summits of the Cascade Mountains as far east as Colville, where the winter-quarters of the expedition were located.

In 1861 parties were pushed forward to the eastward as far as the watershed of the Rocky Mountains (the extreme point to which the Boundary-line had to be run), whence an opportunity was afforded us of paying a hurried visit to the plains at the eastern base of the mountains, as well as of forming collections in their more elevated regions.

General character of the Regions traversed.

Immediately on the 49th parallel (with the exception of the bare Cascade Mountain tops) there is no interruption to the forest from the Gulf of Georgia to the Similkameen valley, on the east side of the Cascade Range. Here, trees not met with on the other side make their appearance, and the country becomes more open, grass in greater or less luxuriance being common under the trees, which in some places disappear almost entirely, as in a great part of the Similkameen valley and the country near Lake Osoyoos, on the hills as well as in the valleys. Indeed, on arriving at the watershed of the Cascade Mountains, a marked difference is observed in this respect. To the westward there is no grass nor food for animals to be found in the forest on the line of march from the Chilukweyuk prairie, near the Fraser River, to the summit of the mountains; on account of which, a great proportion of the loads carried by horses and mules travelling this way must necessarily consist of grain for themselves. The only exception to this dearth of fodder is that near the Chilukweyuk Lake, which is at an altitude of 2052 feet above the sea-level, are some wet and swampy green spots, of small extent and destitute of trees. These are called 'wet prairies,' and are covered chiefly with Gramineæ, Cyperaceæ, and Equisetaceæ, all of very luxuriant growth, and in sufficient quantity to feed a small number of animals, which greedily devour the latter especially, in spite of their siliceous coats. In winter, at times when the grass is deeply covered with snow, the Equisetaceæ, growing under the fringe of trees and bushes bordering the streams, form the principal food of such horses and mules as are unfortunate enough to have to trust entirely to nature for their supplies. As soon as the eastern slope of the Cascades is attained, all difficulty about fodder for animals ceases, and parties may travel from thence to the Rocky Mountains without grain for their beasts of burden. At the same time, with a large organized party like ours, where the mules were kept constantly on the move as long as the ground could be travelled over for snow, there is a short part of the route, between Sinyakwateen on the Pend Oreille River, and Chelemta on the Kootenay, where, on account of the comparative scarcity of grass, especially in autumn, it was considered advisable to pack a certain quantity of grain for the animals, in order to preserve them in full strength and vigour.

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* Sapper John Buttle, R.E. (who underwent a training at Kew before the expedition left England), was excused from his regular duties whenever required to assist me in collecting and preserving specimens, &c., and was found a useful assistant.

Eastward from the valley of the Similkameen the country is generally grassy, with hills of moderate elevation, for a distance of sixty or seventy miles. At the point where the Nehoialpitq River bends suddenly to the southward to join the Columbia, a mountainous region commences. Indeed, from this, all the way to the Rocky Mountains, along the 49th parallel, there is nothing but a succession of steep mountain-ranges, with some narrow valleys and ravines between, and the country altogether is so rugged, that any traveller proceeding from the Similkameen to the Boundary Pass in the Rocky Mountains must necessarily go as far south as the Spokan valley, in about lat. 47° 50′ N., to enable him to accomplish his object.

To return to the west side of the Cascade Mountains: the work there having been finished as far as Roche River, in the heart of the range, it was found necessary, in consequence of the difficulty and time that must have been expended in transporting such a large party across the Cascades, to ascend the Columbia River in order to get to the eastward of those mountains. This was done in steamers as far as the Dalles. Here the party divided, one portion proceeding up the west side of the river, in a northerly direction, by Fort Simcoe, across the Natchess and other tributaries of the Yakima, and across the Upper Yakima River, striking the Columbia again a little below the Wenatchee; from this the trail ran along (still northwards) near the Columbia until it reached the Okanagan valley, up which it led to the Lake Osoyoos. Here the party struck off to the north-west up the Similkameen valley, and on arriving at the Ashtnolo, a mountain-torrent, ascended the ravine through which it runs, and taking the tributary which led most directly to the southward, got close to the 49th parallel, in long. 120° W. The station here was 5480 feet above the sea, and about 2020 feet below the mountain-summits, the access to which was easy. From this point a party proceeded westward to Roche River, thus connecting the Survey with that of the preceding year from the west side of the Cascades.

The route from the Dalles which has just been mentioned, and along which collections were made, crosses several spurs of the Cascades, and the rivers named below the Okanagan have their sources in those mountains, and a short course from thence to the Columbia.

Returning to the Dalles: the other branch of the party kept on the left bank of the Columbia, from the Dalles to Walla Walla, and from thence proceeded northwards to the Snake River, which was crossed where it receives the Peloose. From that they went by the 'Big Lake' nearly due north to Colville, on the banks of the Columbia River.

Nearly the whole of this route was over an arid, comparatively barren and treeless region. Collections were here made at different points by Sapper Buttle.

In the summer of 1861 the line of country in which botanical collections were made ran southwards up the Colville valley, and then through a partially wooded country to the Spokan valley, a great part of which is destitute of trees, and partakes somewhat, in its productions, of the character of the barren grounds of the Columbia. Proceeding in a north-easterly direction, the trail next leads to the Pend Oreille River, which is here densely wooded on both sides, but has, in some places, between the forest and the river, pretty extensive meadow-grounds, which, in June, at the height of the floods caused by the melting of the snow in the mountains, are almost entirely covered with water. From Sinyakwateen, the crossing-place at the Pend Oreille River, the trail runs through a gloomy and almost grassless forest for about twenty or five-and-twenty miles to the Pack River, from whence to the Kootenay the forest is more open.

Along the valley of the Kootenay which we ascended the forest is in most places open, with no scarcity of grass on the right bank. The valley above the place where crossed is very narrow, with steep hills in some places rising abruptly from the river. Above the second crossing of the Kootenay at its south-east bend, and on approaching the Tobacco Plains, the river-banks become more rugged and thickly timbered and grass more scarce, until, suddenly, what was nothing more than a ravine opens out into a wide, almost treeless valley, with many of its plants similar to those of the dry grounds of the Columbia. The trail leading to the Boundary Pass of the Rocky Mountains merely crosses the lower corner of this open valley and enters shortly amongst the Galton Mountains, a range lying between the Kootenay and Flathead Rivers, and rising to an altitude of about 8000 feet above the sea. Crossing by a pass, which on the 17th of July had snow upon it, the trail runs down the eastern slope of the Galton Mountains to the Flathead River, which, at the place where it was forded, was found to be 4005 feet above the sea. The valley of the Flathead is partly clear of trees, and again affords indications of a comparatively dry climate. Immediately on crossing this valley, the Pass of the Rocky Mountains is entered upon. The ascent is at first very gradual until, in the very centre of the range, a steep hill comes in the way, the pass over which was found to be 6970 feet above the sea, wooded on both sides and with scattered stunted trees on the top. On the east side of this hill there is a steep descent to a glen which leads out by a comparatively gentle decline to the Buffalo Plains of the Saskatchewan. These plains, close to the foot of the mountains (the termination of which is very abrupt), are about 5000 feet above the sea.

The camp of the astronomical station on the Rocky Mountains was at an altitude[*] of 6480 feet, close to the 49th parallel; and from this the slaty summits of the mountains (8386 feet above the sea) could be reached, affording an excellent opportunity of forming a complete collection of the vegetation of this elevated region.

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[*] The altitudes given are from observations made by Mr. Bauerman, the Geologist of the expedition.

The longitude of the watershed, as determined by Captain Haig, is 114° 2′ 49″ W.

Botanical Aspects of the Regions traversed.

The harbours of Victoria and Esquimalt, at the south-east corner of Vancouver Island, in the immediate neighbourhood of which most of the plants collected in that island were found, are about three miles distant from each other, although one of the arms of the former is within a few hundred yards of Esquimalt. The country around them is rocky, in some places covered with pine forests, in others open and park-like, and more or less studded with oaks (*Quercus Garryana*, Doug.).

Around the shores of Esquimalt the following trees occur, viz.:—

Pinus contorta, *Doug.*
Abies Douglasii, *Lindl.*
—— Menziesii, *Lamb.*
Thuja gigantea, *Nutt.*
Taxus baccata, *L.*
Arbutus Menziesii, *Pursh.*
Cerasus mollis, *Doug.*
Quercus Garryana, *Doug.*

Arctostaphylos tomentosa is found on hills to the westward of the harbour. Species of *Acer*, *Betula*, *Alnus*, and *Salix* are plentiful. Among the more common shrubs are species of *Mahonia*, *Ceanothus*, *Acer*, *Nuttallia*, *Spiræa*, *Rubus*, *Rosa*, *Ribes*, *Vaccinium*, *Salix*, *Gaultheria*, &c.

Amongst the most conspicuous flowering-plants met with there in the early part of the season are several species of *Ranunculus*, of *Claytonia*, of *Potentilla*, and of *Saxifraga*, *Plectritis congesta*, *Collomia gracilis*, *Collinsia violacea*, *Dodecatheon Meadia*, *Sisyrinchium grandiflorum*, species of *Fritillaria*, *Camassia esculenta*, and species of *Trillium*.

The country gone over on the mainland may, for the convenience of botanical comparison, be, with propriety, divided into three principal regions:—

1st. The Lower Fraser River district, which includes the Sumass and Chilukweyuk prairies and other low grounds to the westward of the Cascade Mountains—a moist region.

2nd. The Columbia valley between the Dalles and Colville—a dry country, for the most part destitute of trees.

3rd. The higher regions of the Cascade and Rocky Mountains—regions of moisture.

The country intersected by the Boundary-line between the Cascade and Rocky Mountains partakes of the character of all these three regions. At the Colville River valley, and in the

Pend Oreille valley, we have an under-vegetation resembling in many of its features that of the Lower Fraser; whilst the productions of the Similkameen valley and the Tobacco Plains, and part of the Flathead valley, approximate to those of the dry region of the Columbia.

Such of the intervening mountain-ranges as we had an opportunity of examining afford specimens of alpine plants the same as were obtained on the Cascades and Rocky Mountains.

With reference to the *first* district, it may be mentioned that the line of separation between Washington Territory and British Columbia for the first twenty-five miles from the sea runs nearly parallel to the Fraser River, and at an average distance of less than ten miles from it. About twenty-four miles inland it strikes one of the spurs of the Cascades. Up to this point the ground is nearly level, but little above the sea, and densely timbered with trees mentioned below.

The Lower Fraser River has along its left or south bank a range of low rocky hills, extending from Langley to the mouth of the Sumass River; and to the southward of these, between them and the spur of the Cascades just mentioned, lies the Sumass prairie. Nearly in the middle of this prairie is the lake of the same name, about ten miles long by four broad at its widest part. During the season of flood it extends from hill-foot to hill-foot, and even after the subsidence of the waters its mud-banks or beaches reach certain points on both sides.

The larger half of the prairie is at the south-west end of the lake, and is (roughly) about four miles square.

The prairie-ground at the north-east end of the lake is bounded by a belt of trees separating it from the clear or prairie ground on the banks of the Chilukweyuk River. The clear ground on both sides of this river has been apparently formed partly by the repeated action of fires, destroying the trees which at one time grew on the higher banks, and partly by the action of the annual floods which overflow a large portion of it.

Most of the collections made in the first district were from the Sumass and Chilukweyuk prairies and from the comparatively low adjoining hills.

These (so-called) prairies have, during the season of flood, more the appearance of immense lakes, being, with the exception of a higher ridge here and there, almost entirely covered by water. As soon as this retreats, the heat of the sun in July and August causes the Grasses and Cyperaceæ to grow with extraordinary luxuriance and rapidity, so that in the beginning of September, when we first visited this part of the country, it was with difficulty that we could believe that it had so recently been inundated, the grass having by this time in many places attained a height of between 5 and 6 feet, and being so dense as to render walking through it exceedingly tiresome.

The autumn of 1858 and part of the summer of 1859 were spent in these localities, and the greater portion of the plants collected were obtained from within a few miles of the Boundary-line on either side.

The banks of the Lower Fraser River and (with the exception of the clear grounds above mentioned) the whole of this district are densely covered with forest, many of the trees in which attain a very large size.

The trees most commonly met with are the *Abies Douglasii*, Lindl. (the Douglas spruce or fir), several specimens of which, measured in the neighbourhood of Sumass, were found to be nearly 30 feet in circumference at five feet from the ground. Two hundred and fifty feet was the measured length of one that had been blown down; but some which we saw must have been considerably higher than this.

The *Abies Menziesii* (Menzies' spruce or fir), a large tree, 25 to 30 feet in circumference, and at least 200 feet high.

The *Abies Mertensiana* (hemlock spruce of our axmen) is a common tree, growing to the height of 150 or 200 feet. Some trees were observed with a perfectly straight trunk of 60 or 70 feet high before giving off a branch.

The *Pinus contorta* is not uncommon here.

The *Thuja gigantea*, Nutt., known as the 'Cedar,' also attains a very large size in this neighbourhood. The circumference of one measured was 26 feet 9 inches at six feet from the ground, and the estimated height 250 feet. This and the Douglas fir are the most useful trees on this part of the coast. There is a large and increasing export of the Douglas fir, both as spars and lumber, from Puget's Sound as well as from Vancouver Island.

Various parts of the 'Cedar' are applied to different purposes by the Indians. The trunk is used to form their canoes, and, when split into slabs (which it is very easily), to build their permanent huts or lodges. The stringy bark and the integuments of the root are plaited into useful and ornamental articles of clothing and household utensils.

At intervals, interspersed amongst the trees already mentioned, we find small clumps or solitary specimens of the *Acer macrophyllum*, Pursh (large-leaved maple). This tree chooses the more open parts of the forest, where it sometimes attains a height estimated at 150 feet. The circumference of one measured was 20 feet. Along with this tree, as well as in other places, we meet with the *Acer circinatum*, Pursh, *Cornus Nuttallii*, And. (which grows to the height of 60 to 80 feet in all, with a straight trunk of 14 or 15 feet before branching, and a diameter of about a foot and a half), the *Alnus viridis*, DC., the *Alnus rubra*, Big. (a common tree, most plentiful in wet places), and the *Betula occidentalis*, Hook. (a tree growing to the height of 60 or 70 feet, and most common about the borders of the forest). Along the immediate banks of the Lower Fraser, on islands and on low grounds subject to annual overflow, narrow belts of poplar (*Populus balsamifera*, L.) of large size frequently occur.

The undershrubs of this district consist chiefly of the following:—

Mahonia, two species.
Acer glabrum, *Torr.*
Spiræa, several species.
Rubus, several species.
Ribes, several species.
Panax horridus, *Pl. & Dcne.*
Lonicera involucrata, *Banks.*
—— occidentalis, *Banks.*
Viburnum Opulus, *L.*
Vaccinium, several species.
Gaultheria Shallon, *Pursh.*

But in the denser parts of the forest no undergrowth exists, the spaces between the trees being filled up by others which have either been blown down by storms or laid prostrate by the hand of time. These are found in various stages of decay, and overriding each other at all angles, rendering progress through such woods in anything like a straight course impossible even for a man on foot and without any burden, and in any direction difficult and laborious. In the more open spots and along the borders of the forests, in addition to the shrubs above mentioned, the following are a few of the most characteristic plants, viz.:—

Anemone nemorosa, *L.*, var.
Aquilegia formosa, *Fisch.*
Dielytra saccata, *Nutt.*
Dentaria tenella, *Pursh.*
Circæa Lutetiana, *L.*
Tellima grandiflora, *Doug.*
Mitella caulescens, *Nutt.*
Tiarella trifoliata, *L.*
Linnæa borealis, *Gronov.*
Chimaphila umbellata, *Pursh.*
Pyrola, three or four species.
Monotropa uniflora, *L.*
—— lanuginosa, *Nutt.*
Arctostaphylos Uva-ursi, *L.*
Castilleja parviflora, *Bong.*
Rhinanthus minor, *Ehrh.*

Calypso borealis, *Salisb.*
Corallorhiza multiflora, *Lindl.*
Platanthera fœtida, *Geyer.*
Cypripedium parviflorum, *Salisb.*
Lilium Canadense, *L.*
Smilacina, three species.
Streptopus amplexifolius, *DC.*
Trillium grandiflorum, *Salisb.*

Along the banks of the Sumass Lake and River and lower part of the Chilukweyuk River, and on the clear grounds or prairies of the same name, besides numerous representatives of the families Junceæ, Carices, Gramineæ, &c., the following plants commonly occur, viz.:—

Ranunculus, several species.
Nuphar advena, *Ait.*
Viola, two or three species.
Stellaria, two or three species.
Cerastium, two species.
Silene Douglasii, *Hook.*
Claytonia, several species.
Geranium Carolinianum, *L.*
Impatiens pallida, *Nutt.*
Rhamnus Purshianus, *DC.*
Cerasus emarginata, *Doug.*
—— demissa, *Nutt.*
Geum macrophyllum, *W.?*
Agrimonia Eupatorium, *L.*
Potentilla, two or three species.
Fragaria, two or three species.
Rubus, several species.
Cratægus sanguinea, *Pall.*
Pyrus rivularis, *Doug.*
Amelanchier Canadensis, *Torr. & Gr.*
Epilobium, several species.
Ribes, several species.
Philadelphus Lewisii, *Pursh.*
Sium lineare, *Mx.*
Cicuta virosa, *L.*
Œnanthe sarmentosa, *Nutt.*
Angelica arguta, *Nutt.?*
Symphoricarpus racemosus, *Mx.*
Sambucus pubens, *Mx.*
Viburnum Opulus, *L.*
Cornus Canadensis, *L.*
Galium, four species.
Plectritis congesta, *Nutt.*
Compositæ, various.
Apocynum, two species.
Menyanthes trifoliata, *L.*
Lithospermum pilosum, *Nutt.*
Mimulus moschatus, *Doug.*
—— luteus, *L.*
Castilleja, two species.
Prunella vulgaris, *L.*
Scutellaria, two species.
Stachys, two species.
Plantago major, *L.*
Polygonum, several species.
Populus tremuloides, *Mx.*
Corylus rostrata, *Ait.*
Salix, several species.
Alisma Plantago, *L.*
Sagittaria variabilis, *Engl.*
Sisyrinchium, two species.

In the *second* region, which extends on one side of the Columbia from the Dalles to the Spokan River, and on the other side runs up through the Okanagan valley and crosses the 49th parallel at Lake Osoyoos and the Similkameen, the vegetation is of a very different character from that met with on the other side of the Cascade Mountains, and bears indications of a much drier climate. A good many of the plants found in this region are strictly local in their distribution. Excepting by the banks of lakes or streams, there are no trees; and some of the orders, such as Ranunculaceæ, Caryophyllaceæ, Portulaceæ, Rosaceæ, Crassulaceæ, Saxifragaceæ, Vacciniaceæ, Orchidaceæ, Liliaceæ, &c., of which species are so plentiful in the first region, have here comparatively few representatives, whilst others, such as Leguminosæ, Onagraceæ, Polemoniaceæ, &c., are more common in this district and give a character to the vegetation; the genera of many other orders are about equally numerous in both.

The following is a list of plants observed only on the comparatively barren grounds of the Columbia valley and in the neighbourhood of the Dalles and Walla Walla, with their geographical distribution:—

Delphinium azureum, *Mx.* United States.
Pæonia Brownii, *Doug.* N.W. America only.
Vesicaria Ludoviciana, *DC.* Local.
Ceanothus integerrimus, *H. & A.* Local.
Glycyrrhiza glutinosa, *Nutt.?* Local.
Petalostemon macrostachyus, *Torr.*
Trifolium fimbriatum, *Lindl.* Local.
—— variegatum, *Nutt.?* Local.
Hosackia stolonifera, *Lindl.* Local.
—— decumbens, *Bth.* Local.
Astragalus succumbens, *Doug.* Local.
—— lentiginosus, *Doug.* Local.
—— Canadensis, *L.* E. and W. of Rocky Mountains.
Phaca podocarpa, *Hook.* Local.
Lupinus leucophyllus, *Doug.* Local.
Thermopsis fabacea, *DC.* Local, and Kamtschatka.
Œnothera albicaulis, *Nutt.* Oregon and Saskatchewan.
—— triloba, *Nutt.?* Red River and Arkansas.
—— parvula, *Nutt.* Local.
—— andina, *Nutt.* Local.
—— densiflora, *Lindl.* Local.
—— quadrivulnera, *Doug.* Local.
Silphium? læve, *Hook.* Local.
Balsamorhiza hirsuta, *Nutt.* Local.
Helianthus petiolaris, *Nutt.* Only Missouri and Arkansas.
Layia glandulosa, *H. & A.* Local.
Antennaria dimorpha, *Nutt.* Local.
Stephanomeria minor, *Nutt.* Platte River.
Gilia Hookeri, *Bth.* Local.
Lithospermum ruderale, *Doug.* Local.
Amsinckia lycopsoides, *A. DC.* Local.
Eritrichium leucophæum, *A. DC.* Local.
Heliotropium Curassavicum, *L.* Generally distributed.
Pentstemon triphyllus, *Doug.* Local.

Pentstemon acuminatus, *Doug.* Local.

Orthocarpus hispidus, *Bth.* Local.

Anoplanthus fasciculatus, *Endl.* Saskatchewan.

Abronia mellifera, *Doug.* Platte River.

Eriogonum angustifolium, *Nutt.* Local.

—— vimineum, *Doug.* Local.

—— elatum, *Doug.* Platte and New Mexico.

—— compositum, *Doug.* Local.

Rumex venosus, *Pursh.* Missouri and Louisiana.

Euphorbia glyptosperma, *Engl.*? E. and W. of Rocky Mountains to New Mexico.

Hesperocordon hyacinthinum, *Lindl.* Local.

The *third* district comprehends the higher regions of the Cascade and Rocky Mountains, including the Galton Range, which lies near the latter, between the Tobacco Plains of the Kootenay and the Flathead River. The highest points at which we had an opportunity of collecting were on the Cascades at 7500 feet, and on the Rocky Mountains at about 8300 feet.

The following is a list of plants which were found to be almost if not entirely confined to those mountains, at a height of at least 4000 feet above the sea, with their geographical distribution :—

Anemone alpina, *L.* Arctic N. America. Cold N.E. and N.W. America and Europe.

—— parviflora, *Mx.* Arctic E. and W. America. Cold E. America.

Ranunculus Eschscholtzii, *Hook.* All Arctic Regions. N. Europe, N. Asia, N.E. and N.W. America, and Himalaya.

Caltha leptosepala, *DC.* Local. Cascade and Rocky Mountains, and northwards.

Trollius patulus, *Salisb.* Siberia.

Aquilegia Canadensis, var. fl. yellow. Local.

Turritis stricta, *Grah.* Columbia valley.

Draba alpina?, *L.* All Arctic Regions. Mountains of cold Europe, Asia, and America, and Himalaya.

—— lævipes, *Hook.* Rocky Mountains only.

Parnassia fimbriata, *Banks.* Rocky and Cascade Mountains, and northwards.

—— palustris, *L.* All Arctic Regions except Greenland. Cold Europe, Asia, America, and Himalaya.

Arenaria nardifolia, *Ledeb.*, var. glandulosa. Arctic E. and W. America. Siberia.

—— verna, *L.*, var. All Arctic Regions. Cold Europe, Asia, and America.

—— arctica, *Stev.*, var. All Arctic Regions. Cold Europe, Asia, and America.

Stellaria borealis, *Big.* Arctic Europe and E. and W. America. Cold Europe, Asia, America, and Himalaya.

Stellaria longipes, *Gold.* All Arctic Regions. Cold Asia and E. and W. America.

Silene acaulis, *L.* All Arctic Regions. Cold Europe and W. America, and tops of White Mountains in United States.

Lychnis apetala, *L.* All Arctic Regions. All cold Asia and America. Himalaya. Antarctic America.

Talinum pygmæum, *A. Gr.* Rocky and Cascade Mountains only.

——, n. sp.? Cascade Mountains only.

Spraguea umbellata, *Torr.* Cascades and California only.

Spiræa pectinata, *Torr. & Gr.* Arctic W. America.

—— corymbosa, *Raf.*, var. β. Cold E. and W. America and Kamtschatka.

Dryas octopetala, *L.* All Arctic Regions. Cold Europe, Asia, and America.

Geum strictum, *Ait.* Arctic Europe and Arctic E. America. Cold Europe, Asia, and America. Cold S. America. Himalaya. Australia.

Sibbaldia procumbens, *L.* Arctic Europe and Greenland. Cold Europe, Asia, and America, and Himalaya.

Potentilla diversifolia, *Lehm.* Rocky and Cascade Mountains, and northwards.

—— nivea, *L.*, var. γ. Arctic and cold Europe, Asia, and America, and Himalaya.

Epilobium alpinum, *L.* Arctic and cold Europe, Asia, and America, and Himalaya.

Sedum Rhodiola, *DC.* All Arctic and cold Europe, Asia, and America, and Himalaya.

—— stenopetalum, *Pursh.* Rocky Mountains and Platte.

Saxifraga bronchialis, *L.* Arctic Europe, Asia, and W. America. Cold Asia and Rocky Mountains.

—— cernua, *L.* Cold and Arctic E. and W. America, and Himalaya.

—— ranunculifolia, *Hook.* Cascade and Rocky Mountains, and hills near the Kettle Falls of the Columbia.

—— hyperborea, *Br.* Arctic and cold Europe, Asia, and America.

—— Virginiensis, *Mx.* Arctic E. America. Cold E. and W. America.

—— heterantha, *Hook.* Cascade and Rocky Mountains, and northwards.

—— Dahurica, *Willd.* Arctic W. America. Cold Asia. Rocky Mountains.

Mitella pentandra, *Hook.* Cascade and Rocky Mountains and California.

—— nuda, *L.* Arctic E. America. Cold Asia and E. and W. America.

Cymopterus, n. sp. Cascade Mountains only.

Valeriana capitata, *Willd.* All Arctic and cold Europe, Asia, and America, except Greenland.

Nardosmia palmata, *Hook.* Arctic and cold E. and W. America and N.E. Asia.

Aster salsuginosus, *Rich.* Arctic and cold E. and W. America.

—— Engelmanni, *A. Gray.* Rocky and Cascade Mountains.

Actinella acaulis, *Nutt.* East side of Rocky Mountains and Platte.

Senecio canus, *Hook.* N.E. and N.W. America.

——, n. sp.? near frigidus. Rocky Mountains only.

Arnica angustifolia, var. Arctic Europe and E. and W. America. Cold Europe, Asia, and America.

—— mollis, *Hook.* Rocky and Cascade Mountains.

—— Chamissonis, *Less.* Rocky and Cascade Mountains, and northwards. White Mountains of N. America.

Macrorhynchus elatus, *Nutt.*? Oregon and Cascade Mountains only.

Youngia pygmæa, *Ledeb.* Rocky Mountains. Arctic E. and W. America. Siberia.

Moneses grandiflora, *Salisb.* N.E. and N.W. America. Europe and Siberia.

Cladothamnus pyroliflorus, *Bong.* From the mouth of the Fraser River northward to Sitcha.

Menziesia Grahami, *Hook.* Rocky and Cascade Mountains.

—— glanduliflora, *Hook.* Rocky and Cascade Mountains, and northwards.

—— empetrifolia, *Sm.* Cascade and Rocky Mountains.

Andromeda (Cassiope) cupressina, *Hook.* Cascades to Sitcha.

—— tetragona, *L.* Arctic Europe, Asia, and America. Cold Asia and America.

Kalmia glauca, *Ait.* Arctic and cold E. and W. America.

Rhododendron macrophyllum, *Don.* Cascade Mountains and California.

—— albiflorum, *Hook.* Cascade and Rocky Mountains.

Ledum glandulosum, *Nutt.* Cascade and Rocky Mountains and California.

Gentiana Parryi, *Engl.* Cascade and Rocky Mountains, and southwards.

—— propinqua, *Rich.* Arctic and cold E. and W. America.

Polemonium pulcherrimum, *Hook.* Rocky Mountains. Arctic Europe. E. and W. America.

—— confertum, *A. Gr.* Rocky Mountains and southwards.

Myosotis sylvatica, *Hoff.* Arctic Europe, Asia, and America, but not Greenland. Cold Europe, Asia, and America, and Himalaya.

Eutoca sericea, *Hook.* Rocky Mountains only.

——, n. sp.? near Franklinii. Rocky Mountains.

Romanzovia Sitchensis, *Bong.* California. Unalaschka.

Pentstemon Menziesii, *Hook.* Vancouver Island, Cascade Mountains, and California.

—— confertus, *Doug.* Rocky Mountains and California.

Veronica alpina, *L.* Arctic Europe, Asia, and Greenland. Cold Europe, Asia, and America.

Pedicularis surrecta, *Bth.* California, Cascade and Rocky Mountains, and Hudson's Bay.

—— racemosa, *Doug.* Cascade and Rocky Mountains to California.

—— bracteosa, *Bth.* Cascade and Rocky Mountains. Saskatchewan south to Colorado.

Pinguicula vulgaris, *L.* Arctic Europe and E. America. Cold Europe and America.

Androsace septentrionalis, *L.* Arctic and cold Europe and Asia (Greenland excepted).

Dodecatheon dentatum, *Hook.*? Cascades only.

Eriogonum umbellatum, *Torr.* Cascade and Rocky Mountains south to Colorado River.

Oxyria reniformis, *Hook.* All Arctic and all cold Europe, Asia, and America, and the Himalaya.

Polygonum viviparum, *L.* All Arctic and all cold Europe, Asia, and America, and the Himalaya.

Betula glandulosa, *Mx.* Arctic and cold E. and W. America.

Salix cordata, *Mhlbrg.* Arctic and cold E. America. Cascade and Rocky Mountains.

—— glauca, *L.* All Arctic and cold Europe, Asia, and America.

—— arctica, *Pall.* Arctic and cold E. and W. America. Cold Asia.

—— phlegophylla, *And.* Arctic E. and W. America. Cold W. America.

—— reticulata, *L.*, vars. nana and vestita. Arctic and cold E. and W. America.

Pinus flexilis, *Torr.* Cascade and Rocky Mountains. Colorado.

Larix Lyallii, *Parl.*, n. sp. Cascade and Rocky Mountains.

Peristylus bracteatus, *Lindl.* Arctic Europe. Cold Europe, Asia, and N.E. America.

Xerophyllum tenax, *Nutt.* Rocky and Cascade Mountains.

Stenanthium, n. sp. Cascade Mountains. Kootenay River.

Juncus xiphioides, *Mey.* California. Cascades and Rocky Mountains.

Carex Mertensii, *Prescott.* Cascade Mountains.

—— canescens, *L.* Arctic Europe and E. America. Cold Europe, Asia, and America. Extratropical S. America. Australia.

—— comosa, *Boott.* Cascade Mountains. U.S. America.

—— verticillata, *Boott.* N.W. America.

—— tenella, *Schk.* Cold N.E. and N.W. America.

—— Nardina, *Fries.* Arctic Europe and E. America. Cold Europe and E. America.

—— Rossii, *Boott.* Cascade Mountains and Rocky Mountains. New Mexico.

—— scirpoidea, *Mx.* Arctic and cold E. America and cold Europe.

—— rigida, *Good.* Arctic Europe, Asia, and N.E. America. Cold Europe and E. America.

—— Lyallii, *Boott*, n. sp. Cascade Mountains.

—— cæspitosa, *L.* (*Boott*!) Arctic Europe. E. and W. America. Cold Europe, Asia, and America.

—— atrata, *L.*, var. Arctic Europe. E. and W. America. Cold Europe and Asia. Top of White Mountains in America. Himalaya.

—— nigricans, *Mey.* Rocky Mountains.

Scirpus cæspitosus, *L.* Arctic Europe. E. and W. America. Cold Europe, Asia, and America.

Alopecurus alpinus, *L.* Arctic and cold Europe, Asia, and America, and cold S. America.

Cinna pendula, *Trin.* Cascade Mountains. Amoor River; Siberia; Norway; Middle Russia; Sitcha.

Trisetum subspicatum, *Beauv.* Arctic Europe and E. and W. America. Cold Europe, Asia, and America. Andes; Himalaya; Australia.

Poa alpina, *L.* Arctic Europe and E. and W. America. Cold Europe, Asia, and America, and Himalaya.

Polypodium alpestre, *Hoff.*

The plants gathered by us at the eastern base of the Rocky Mountains which we did not also obtain from other localities are so few in number, that it appears hardly necessary to notice them in this report. They are the following, viz.:—

Geranium albiflorum, *Hook.*
(Hookerianum, *Walp.*)
Astragalus pauciflorus, *Hook.*
Oxytropis splendens, *Doug.*
Hedysarum boreale, *Nutt.*
Actinella acaulis, *Nutt.*
Alopecurus alpinus, *L.*

Of these, the only one which has not also a locality assigned to it to the westward of the Rocky Mountains is *Oxytropis splendens.*

Notes on the Distribution of the principal Trees met with near the 49th degree of Latitude, and the Elevation to which they reached, between the Gulf of Georgia and the Rocky Mountains.

Pinus monticola, Doug., was found in Vancouver Island, as well as in the Lower Fraser River district, and is a common tree in the wooded valleys lying between Colville and the Rocky Mountains.

Pinus contorta, Doug., is very common in various situations in Vancouver Island as well as on the mainland. On the east side of the Cascade Mountains it forms the great bulk of the forest between the altitudes of 4500 and 6500 feet above the sea, where the size of large trees is about 1½ foot in diameter and 60 or 70 feet high. On the Rocky Mountains it was observed at 7000 feet above the sea. Along both sides of the trail in the passes of the Galton and Rocky Mountains, many of the young trees of this species are stripped of their bark from a foot or so above the ground to a height of six or seven feet. This is done by the Indians, during their annual hunting-excursions from the Kootenay and Kalispelm country to the Buffalo Plains on the east side of the Rocky Mountains, for the sake of the inner bark, which they use as food, as well in its fresh state as when compressed into thick cakes so as to render it portable. Near the south-east end of Vancouver

Island this tree is common in rocky situations and on promontories exposed to the gales of the Straits of Fuca, where it varies considerably in size, being for the most part stunted, but in some places attaining a height of 50 or 60 feet.

Pinus flexilis, Torr., was first observed by us near the eastern summit of the Cascade Mountains, about 7000 feet above the sea, where it was found as the highest tree of the forest belt, growing amongst rocks and granite débris, exposed to the full force of the storms which so frequently sweep over this elevated region. Here it was quite stunted and shrubby in its habit. The trunk of the largest seen in this situation was about 15 feet high, bulging out a little for a foot or so above the ground, then tapering pretty rapidly, and spreading out at the top into a number of thickish branches. No cones of this tree could be found on the Cascades; in the following year, however, they were procured both on the Galton and Rocky Mountains in great plenty, but unfortunately all too young for the seed to be of any use. The seed, which is about the size of a pea, is sweet and palatable, and is eaten by the Indians. This tree was found growing on the Rocky Mountains at an elevation of 8000 feet.

Pinus ponderosa, Doug. Immediately on penetrating to the eastward of the Cascade Mountains this fine tree was met with, but was not seen on the Pacific side of that range. It extends from the eastern slope of the Cascades, where individual specimens were seen as high as 3600 feet, to the base of the Rocky Mountains. Its most common associate along this line of country is the *Larix occidentalis*. Wherever these are found growing together, the ground is usually more or less level (flat land, or hills of no great steepness), covered with grass, and so open as to render progression easy, without confining the traveller constantly to the cleared and beaten trail, as is always the case in the forests west of the Cascade Mountains.

In the district spoken of, narrow valleys and ravines, as well as the steep sides of hills with northern exposures, are mostly inhabited by species of *Abies*, with which the *Pinus ponderosa* and Larch do not care to mingle; and in these situations no grass is to be found, although the prairie-ground extends to the very margin of the bank or ravine.

About Colville the *Pinus ponderosa* rivals in usefulness the Douglas fir on the coast, and is applied to most of the same purposes. This was the tree used on several occasions to form canoes to enable our parties to cross the deeper rivers, and it answered the purpose very well, being easily dug out, but it floated rather deep in the water.

Abies Mertensiana, Lindl. (Hemlock spruce of our axmen), one of the most common trees on the west side of the Cascades, is also met with on the east side, but is not so common, nor does it attain the same height as near the coast.

Abies Menziesii, Lamb., is common all along the line from the Pacific to the Rocky Mountains. It is one of the common trees already mentioned as existing in the ravines between the latter and the Cascades. On the Cascade Mountains it was observed at a height of about 5500 feet above the sea, and on the Galton and Rocky Mountains it was found as high as 6000 feet.

Abies Douglasii, Lindl., is usually found along with the preceding. This tree, which is such a giant in the Lower Fraser River district, becomes stunted and dwarfish on exposed promontories and at great elevations. It ceases to be common at an altitude of about 5500 feet above the sea, but scrubby specimens were seen on the Cascades nearly 2000 feet higher than that. It never attains the same proportions east of the Cascade Mountains that it does on the other side.

Abies amabilis, Doug., is not uncommon on the Cascade Mountains up to 6000 feet, and on the Rocky and Galton Mountains was found at an elevation of 7000 feet.

Abies grandis, Doug.?, was seen on the Cascade Mountains, and on their spurs running down to the Columbia River.

Picea nobilis?, Don (*balsamea*?), was found on the Cascade Mountains, near Lake Chilukweyuk. It is a large and handsome tree, with a soft wood easily cut by the axe. The bark, especially of the young, is smooth and shining, and covered with blisters containing a turpentine or balsam-like fluid.

Larix Lyallii, Parl. (n. sp.). First seen on the Cascade Mountains, where, at from about 6500 to 7000 feet, it formed in one place an open belt of trees, towards the upper part mingled with and afterwards overtopped by the *Pinus flexilis*. On the Galton Range it was found under the same circumstances at an altitude of about 6000 feet, and on the Rocky Mountains at 7000 feet. In the latter situation it was associated with the *Pinus flexilis* and the *Abies amabilis*.

Larix occidentalis, Newb. (an Nutt.?), occurs frequently between the Cascade and Rocky Mountains, associated with the *Pinus ponderosa*; and as the *Pinus ponderosa* here supplants for many purposes the Douglas fir, so the larch, from its splitting so easily, is applied to many of the uses fulfilled by the *Thuja gigantea* ('Cedar') on the other side of the Cascades, such as making shingles, rails for fences, &c.

Thuja gigantea, Nutt., which, as already mentioned, is common and grows to a very large size near the sea-coast, is comparatively scarce in the interior, where it is only met with in damp, shady ravines, or near moist river-banks such as those of the Pend Oreille; but even there it seldom attains a size at all to be compared with that which it reaches on the western side of the Cascades.

Juniperus Virginiana, L., occurs occasionally in the form of a tree in Vancouver Island, as well as along the boundary up to the Rocky Mountains. The measurements of one at Esquimalt were—circumference at six feet above the ground, 5 feet 4 inches; length of same tree (which had been blown down) 46 feet. Lowest branch five feet from the ground.

Acer macrophyllum, Pursh, one of the ornamental trees of the western forests, was not observed to the eastward of the Cascade Range.

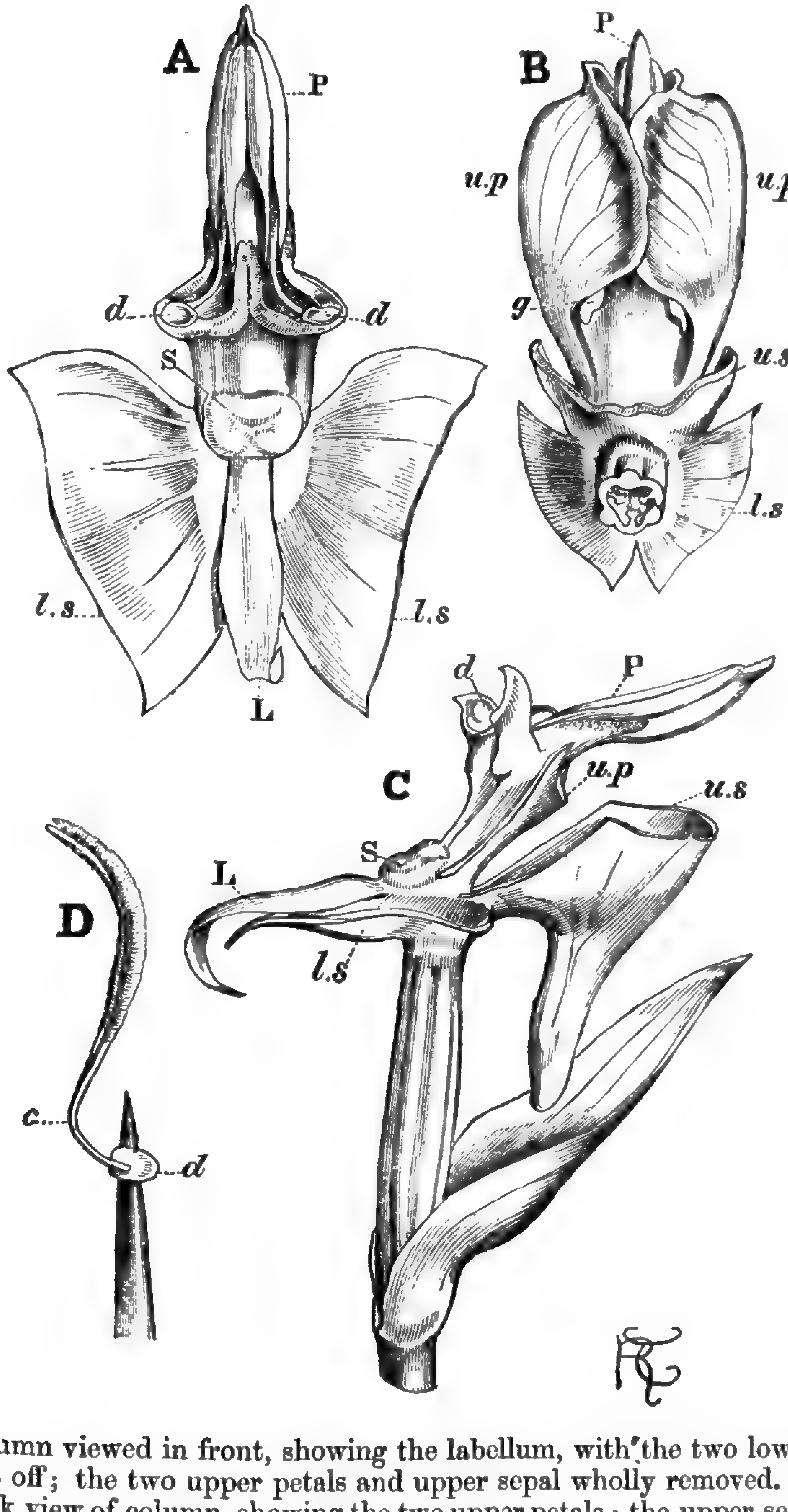
Quercus Garryana, Doug. (the only Oak seen), which is plentiful at the S.E. end of Vancouver Island, was not found on the mainland anywhere along the 49th parallel. It was seen in the neighbourhood of the Dalles, but did not extend much higher on the Columbia.

On the Fertilization of *Disa grandiflora*, Linn. By ROLAND TRIMEN, Esq., of the Colonial Office, Cape Town: drawn up from Notes and Drawings sent to C. DARWIN, Esq., F.L.S., &c.

[Read June 4, 1863.]

As none of the many various South African Orchids have been described in relation to their manner of fertilization, I have thought that a brief account of the structure of the *Disa grandiflora* might be acceptable.

In the great majority of Orchids the labellum, or lower lip, secretes nectar, and stands in front of the column which bears the stigma and pollen-masses. In the *Disa* the labellum is greatly reduced in size; the posterior sepal, on the other hand, is largely developed, and forms a spur which contains nectar. As the nectary thus stands at the back of the column (see fig. C) behind the stigma and pollen-masses, in a directly opposite position to that which it occupies in other Orchids, it may naturally be asked,



A. Column viewed in front, showing the labellum, with the two lower sepals partly cut off; the two upper petals and upper sepal wholly removed.

B. Back view of column, showing the two upper petals: the upper sepal is cut off so close that the nectary is not shown.

C. Side view of the column and ovarium, with the labellum viewed edgeways; with the upper petals and upper sepal partly cut away, with the spur or nectary left.

D. Pollinium, attached to a needle, viewed laterally.

P. pollinium.
d. disc of pollinium.
c. caudicle of pollinium.
S. stigma.

L. Labellum.
u. p. upper petals.
u. s. upper sepal with nectary.
l. s. lower sepals.
g. gateway or passage leading to the nectary, between the upper petals and the column.

How can insects effect the fertilization of the flower? This is effected with marvellous simplicity by a very slight change in the form of the two upper petals, and in the position of the viscid discs of the pollen-masses.

The upper sepal is of large size, with the basal margins folded inwards, and these, together with the two upper petals which overlap each other behind, enclose the column, so that insects, to reach the nectar, are compelled to approach the flower in front, in precisely the same manner as if the labellum secreted nectar. But as the column stands in the way of the nectary, insects must push their probosces or heads on either side of it, in order to reach the nectar. The flower is manifestly constructed to favour this action; for the two upper petals have narrow bases, which leave a small open gateway on each side of the column, as may be seen in the drawing (B) of these two petals and of the back of the column. In all common Orchids the two viscid discs, to which the pollen-masses are attached, stand close together or are some way removed from each other; but they always face either the base or the sides of the labellum. In the *Disa* the two discs are widely removed from each other, and face outwards from the labellum towards the margins of the column, as may be seen in the front view (A) of the flower.

It is impossible to doubt the meaning of this unusual position of the discs; for they are thus seated on the inner margins of the two gateways or passages which lead to the nectary. If a needle be inserted through one of these passages, it inevitably touches the extremely viscid disc of that side; and when the needle is withdrawn, the pollinium is withdrawn. In figs. A and C the position of the medial stigma, seated some way beneath the discs, may be seen; and in fig. D the shape of the elongated pollinium, attached to a needle, is shown, with the caudicle bent almost at right angles near to the disc. In most British Orchids, when the pollinia are removed from their cases, the caudicles undergo a movement of depression, caused, as described by Mr. Darwin, by the contraction of the discs; and at the same time they bend either outwards or inwards, always in strict relation to the position of the stigma. In the *Disa* there is no movement of this nature, but the end of the much-elongated pollinium bends downwards, from its weight, and is brought towards the centre of the flower by the crookedness of the caudicle; so that when a needle, with a pollinium attached to it, is inserted into the passage leading to the nectary, the end of the pollen-mass strikes the stigma and leaves pollen-grains on its sticky surface. Thus in the *Disa*, notwithstanding the remarkable difference in the position of the nectary, every part of the flower, by the aid of very slight modifications, has become neatly coordinated to ensure fertilization through the agency of insects.

The *Disa* carpets with its narrow lanceolate leaves the margins of the almost dry watercourses on the southern spur of the Table Mountain. In February its superb flowers expand. When I examined the plants, most of the flowers were partially withered; but in the greater number, even in those quite withered, both pollinia were still in their cases; in not one instance had both been removed; but in several flowers one had been carried away. In some of the withered flowers the pollinia protruded from the anther-case; and in a few instances the upper sepal, in curling inwards, had touched the disc and had drawn out the pollinium: but I saw no case in which the pollen-grains had thus reached the stigma. Considering how well stored the nectary is with honey, it is surprising that the flowers are not more regularly visited; but as the nectar fills the lower part alone of the nectary, only insects with a long proboscis could reach it; and perhaps the larger moths are rare at the elevation at which this plant grows. The remarkably brilliant colours, however, of the flower probably indicate that it is attractive to some day-flying Hymenopterous or Lepidopterous insect. However this may be, the infrequency with which the pollen-masses are removed offers a nearly parallel case to that described by Mr. Darwin, of the extremely imperfect fertilization of the *Ophrys muscifera* in England.

On the *Musci* and *Hepaticæ* from the Cameroons Mountain and from the River Niger.

By WILLIAM MITTEN, A.L.S.

[Read June 18, 1863.]

THE species here enumerated appear to represent a Moss vegetation similar to that of tropical America; in a few instances they are apparently identical, but for the most part they are rather cognate forms; with those found at the Cape they appear to have but a small affinity. On the higher parts of the Cameroons Mountain the species are absolutely identical with those from the mountains of Abyssinia, intermixed with a few hitherto only known from the Island of Bourbon.

DICRANACEÆ, *Mitten.*

LEPTOTRICHUM, *Hampe.*

(*Distichium*, Bryol. Europ.)

L. CAPILLACEUM, *Hedw.*
Hab. Cameroons Mountain, alt. 7000 feet.

LEUCOLOMA, *Brid.*

L. SECUNDIFOLIUM, sp. nov. Dioicum, cæspitosum, caule ramoso, foliis falcatis secundis e basi latiore sensim longe angustatis apice angustissimis marginibus apice minute serrulatis nervo angusto pallido excurrente, cellulis in folii medio oblongis superioribus obscuriusculis ad margines angustis elongatis hyalinis medium versus folii longitudinis limbum latiusculum formantibus longe infra apicem evanescentibus, alaribus pluribus quadratis fuscis, perichætialibus e basi oblonga convoluta subulatis, theca in pedunculo semiunciali rubro ovali cylindracea, peristomio dentibus brevibus ut plurimum trifidis.

Hab. Island of St. Thomas, lat. 0, *Mann.*

Pale glaucous green; stems two to three inches high, curved; leaves secund, at the apices of the stems falcate. A more robust species than *L. macrodon*, Hook.

DICRANUM, *Hedw.*

(*Pedunculus erectus.*)

D. OBLIQUATUM, sp. nov. Dioicum, cæspitosum, caule humili ramoso, foliis subsecundis e basi latiore sensim longe angustatis, nervo latitudinis folii partem tertiam occupante fere ad apicem a pagina distincto, apice dorso marginibusque serrulatis, cellulis alaribus a reliquis non discretis, basi oblongis rectangularibus, ad nervum majoribus et spatium fere quartum folii basis occupante, inde oblongis, ad apicem rotundatis, perichætialibus e basi latiore oblongo-ovata convoluta subulato-attenuatis, theca in pedunculo elongato gracillimo luteo-viridi recto inclinata cylindracea inæquali viridi siccitate plicata, operculo subulato longe rostrato rubro, peristomio dentibus elongatis dicranis.

Hab. Peak Clarence, Fernando Po, on trees, *Mann.*

The foliage of this species resembles that of *D. fulvum*, Hook.; but the capsule is more like that of *D. Scottianum*, Turn., which is a much larger species. *D. flagellare*, Hedw., has leaves wider upwards, with a different structure at the base; in *D. obliquatum* the place of the alar cells is evident, but the brown enlarged cells appear to be dispersed through the base of the leaf in an irregular manner. The inclined capsule of this moss gives it a different appearance from any of its near allies.

(*Pedunculus flexuosus.*)

D. STRAMINEUM, sp. nov. Dense cæspitosum, caule elongato inferne

fusco tomentoso parce ramoso, foliis erecto-patentibus e basi latiore sensim longe angustatis, marginibus integerrimis incurvis, nervo basi $\frac{3}{8}$ superne totam folii latitudinis occupante, cellulis alaribus pallide fuscis, inde ad latera angustis hyalinis, interioribus latioribus sensim superne in minutas oblongas rotundatasque transeuntibus, perichætialibus externis e basi ovata latiore internis e basi oblonga convoluta subulatis, theca in pedunculo cygneo flexu ovali æquali plicata, operculo subulato rostrato, peristomio dentibus rubris dicranis, annulo composito, calyptra basi fimbriata.

Hab. Cameroons Mountain, alt. 9000 feet, *Mann.*

Closely allied to *D. nivale*, Brid., but seems to differ in the less rigid foliage and more evident lamina of the leaf at the base. The stems are from two to three inches in height, and the foliage yellowish green and straw-coloured.

D. DIVARICATUM, sp. nov. Laxe cæspitosum, caule erecto ramoso radicellis rubris tomentoso, foliis divaricatis lanceolato-subulatis apice serrulatis, nervo lato tertiam partem folii latititudinis occupante fere ad apicem a pagina discreto percurrente, cellulis alaribus numerosis a reliquis distinctis fuscis, basi ad nervum paucis oblongis ad margines brevibus quadratis, inde ad apicem parvis rotundatis.

Hab. Prince's Island, *Barter.*

Remarkable for its divaricate leaves, which when dry are incurved; it approaches *D. arenicolum*, C. Müller.

D. NIVALE, *Brid.*

Hab. Cameroons Mountain, alt. 9000–10,000 feet, on rocks, *Mann.*

D. ERICETORUM, *Mitten.*

Hab. Cameroons Mountain, alt. 7000–10,000 feet, on rocks, *Mann.*

These specimens are fertile; in the barren state the species is found in the warmer parts of Europe and the Atlantic Islands, but always without fruit.

DIDYMODON, *Hook.*

D. RADICOSUS, sp. nov. Caule elongato, foliis e basi erectiuscula latiore recurvis squarrosis subsecundis lanceolatis nervo excurrente carinatis complicatisque, marginibus ad medium reflexis inde ad apicem serratis, cellulis basi elongatis pellucidis ad angulos brevibus quadratis superioribus rotundatis omnibus distinctis vix papillosis, perichætialibus exsertis longe convolutis, theca in pedunculo luteo flexuoso cylindracea pallida ore rubro, operculo subulato longirostro, peristomio dentibus angustis brevibus.

Hab. Cameroons Mountain, alt. 8000 feet, *Mann.*

Larger than its near allies, *D. squarrosus*, Hook., *D. sulphureus* and *D. aggregatus*, C. Müller. Leaves scarcely papillose, and cells everywhere with distinct pellucid interstices. Several rows of cells break up at the mouth of the capsule to form the annulus.

D. PUNGENS, sp. nov. Caule elongato ramoso, foliis e basi lata erecta sensim angustatis lanceolatis recurvis subsecundis complicatis, nervo in apicem tenuem excurrente, marginibus inferne reflexis apicem versus serratis, cellulis basi elongatis angustis sublævibus pallidis ad margines superioribusque omnibus minutis rotundatis subobscuris minutissime papillosis, perichætialibus interioribus erectis convolutis pellucidioribus, theca in pedunculo breviusculo gracili pallido ovali-oblonga erecta, operculo conico-acuminato, peristomio dentibus brevibus gracilibus.

Hab. Cameroons Mountain, alt. 10,000 feet, on rocks, *Mann.*

More slender than *D. radicosus,* and destitute of the rootlets amongst the leaves. The foliage, when dry, is nearly erect and appressed. The leaves are attenuated into a slender sharp point, and, excepting in two oblong spaces on each side of the nerve in the erect base occupied by the narrow elongated cells, they are everywhere nearly obscure.

D. FLEXIFOLIUS, *Hook. et Tayl.*

Hab. Cameroons Mountain, alt. 8000 feet, and on rocks inside the largest crater, Peak Clarence, Fernando Po, *Mann.*

D. PURPUREUS, *Hedw.*

Hab. Cameroons Mountain, alt. 8000 feet, *Mann.*

D. CYATHICARPUS, (Zygodon) *Mont.*

Hab. Cameroons Mountain, alt. 8000 feet, *Mann.*

This species was gathered in Abyssinia by Schimper.

LEUCOBRYACEÆ, *C. Müller.*

LEUCOPHANES, *Brid.*

L. UNGUICULATUS, sp. nov. Late cæspitosus, caule humili ramoso, foliis densis patentibus subsecundisve e basi concava latiore lanceolatis complicatis apice obtusis, nervo in apiculum brevissimum recurvum excurrente dorso lævi, margine tenui integerrimo, cellulis omnibus oblongis pellucidis.

Hab. Prince's Island, at the base of Oil Palms, *Barter.*

A little more robust than *L. glaucus* or *L. octoblepharoides,* from the more densely inserted leaves. The recurved point of the nerve, forming a small hook, is peculiar.

TRICHOSTOMACEÆ, *Mitten.*

ANŒCTANGIUM, *Hedw.*

A. SPATHULATUM, sp. nov. Cæspitosum, caule subsimplici radiculoso, foliis superioribus patentibus, apicalibus paululum recurvis elliptico-lanceolatis spathulatis, basi angustioribus nervo percurrente carinatis apice acutis integerrimis, cellulis parvis subobscuris basi ad nervum paucis oblongis pellucidioribus angulis decurrentibus, perichætialibus

late ovatis acutis, theca in pedunculo elongato gracili pallido elongato-ovali cylindracea, operculo longe subulirostrato.

Hab. Cameroons Mountain, alt. 8000 feet, on the ground, *Mann.*

In size and habit like the larger states of *A. æstivum*, Hedw., but with its upper leaves narrowed at the base, and a rather more dense areolation.

TORTULA, *Hedw.*

T. CYLINDRICA, (Weissia) *Bruch.*

Hab. Cameroons Mountain, alt. 7000 feet, *Mann.*

SYRRHOPODON, *Hook. et Grev.*

S. ARMATUS, sp. nov. Dioicus, late cæspitosus, caule brevi ramoso radicellis purpureis tomentoso, foliis e basi erecta paululo latiore utrinque dentibus setiformibus 3–6 ciliata lineari-lanceolatis patentibus concavis apice acutatis integerrimis, nervo angusto dorso aspero in mucronem excurrente, cellulis calymperoideis spatium subellipticum folii basis totum occupantibus, inde ad apicem minute rotundatis obscuris, dorso papillosis, theca in pedunculo gracili bilineari ovali, operculo subulato subæquilongo, peristomio dentibus brevibus.

Hab. Bagroo River and banks of the Nunn, on dead bark, *Mann.*

Very near to *S. spiculosus*, Hook. et Grev., and *S. trachyphyllus*, Mont., but with leaves more narrow at the base (scarcely wider than the upper portion), the nerve evidently excurrent, the marginal cilia at the base longer.

S. LAMPROCARPUS, sp. nov. Caule elongato parce ramoso, foliis e basi erecta oblonga vaginante patentibus anguste subulato-lanceolatis, nervo pallido dorso lævi percurrente, margine in parte vaginante lato pallido, inde ad apicem angustiore serrulato, cellulis calymperoideis totum partis vaginantis occupantibus inde ad apicem minutissimis obscuris, perichætialibus conformibus apicibus ad basin thecæ cylindraceæ vermicularis attingentibus, pedunculo rubro, operculo longe subulato, peristomio dentibus rubris angustis, calyptra fere basin thecæ tegente.

Hab. Fernando Po, *Mann.*

Stems one inch and a half high, slender, apparently not growing in a tufted manner. Leaves very pale green, rather remotely inserted, unaltered in position when wet or dry; including the base, they are about three lines long. Whole plant a little more robust than *S. tristichus*, Nees ab E., with which it nearly agrees in general appearance.

CALYMPERES, *Swartz.*

C. AFZELII, *Swartz.*

Hab. Banks of the Nunn, and Prince's Island, *Mann.*

GRIMMIACEÆ, *Mitten.*

GRIMMIA, *Ehrh.*

G. ABYSSINICA, *B. et S.*

Hab. Cameroons Mountain, alt. 12,000 feet, with *Bryum pallescens*, Schw., *Mann.*

The inflorescence in these specimens, as well as in those from Abyssinia, is monœcious, and not diœcious, as described by Müller, Synops. p. 772.

ORTHOTRICHACEÆ, *Mitten.*

ZYGODON, *Hook. et Tayl.*

Z. SEMITORTUS, sp. nov. Dioicus, caule subunciali dichotome ramoso, foliis e basi brevi erectiuscula divergentibus semitortis elliptico-lanceolatis basi angustatis angulis decurrentibus integerrimis nervo sub apice latiusculo acuto evanescente carinatis, cellulis rotundatis distinctis sublævibus basi vix ullis diversiformibus, perichætialibus conformibus; theca in pedunculo 3–4-lineari ovali plicata, collo pyriformi, operculo subulato obliquo, peristomio ciliis 8 brevibus.

Hab. Cameroons Mountains, alt. 8000 feet, *Mann.*

A large species, resembling *Z. Reinwardti*, Schw., but with entire leaves.

MACROMITRIUM, *Brid.*

M. LEVATUM, sp. nov. Cæspitosum, ramis erectis ramosis, foliis patenti-recurvis siccitate tortis late lanceolatis, apice in mucronem acuminatis nervo percurrente carinatis, marginibus uno latere inferne reflexis superne minute crenulatis, cellulis basi elongatis angustis, nonnullis paulo supra basin grosse papillosis, medium versus in parvas rotundatas diametro circiter $\frac{1}{3000}$ uncii metientes læves transeuntibus, perichætialibus paulo latioribus erectis, theca in pedunculo elongato globoso-ovata collo sensim attenuato plicata, operculo conico subulato, calyptra nuda thecam totam tegente, peristomio simplici.

Hab. Cameroons Mountain, alt. 8000–10,000 feet, on trees and rocks, *Mann.*

Allied to *M. sulcatum*, Hook., and, like it and its near allies, with a small triangular mass of calymperoid cells on one side of the nerve at the base of the leaf. The capsule is slightly and irregularly plicate when old; before the fall of the operculum it is smooth.

M. MENZIESII, sp. nov. *M. levato* simillimo, foliis late lanceolatis nervo excurrente carinatis, cellulis basi elongatis angustis papillosis superioribus rotundatis obscuris diametro circiter $\frac{1}{6000}$ uncii metientibus, theca in pedunculo elongato lævi basi plicata late ovata, operculo conico subulato, peristomio simplici, calyptra nuda.

Hab. Sierra Leone, *Menzies in Herb. Hooker.* Fernando Po and Island of St. Thomas.

Very nearly resembling the preceding species and *M. sulcatum*; but the mature capsule is smooth and plicate only in the neck, and its leaves are of a more dense structure.

FUNARIACEÆ, *Mitten.*

ENTOSTHODON, *Schwægr.*

E. CURVIPES, *C. Müller.*
Hab. Cameroons Mountain, alt. 7000–8000 feet. Agrees exactly with the Abyssinian specimens.

FUNARIA, *Schreb.*

F. HYGROMETRICA, *Dill.* (F. calvescens, *Schw.*)
Hab. Cameroons Mountain, alt. 7000 feet.

BARTRAMIACEÆ, *Mitten.*

BARTRAMIA, *Hedw.*

B. STRICTA, *Brid.*
Hab. Cameroons Mountain, alt. 7000 feet, *Mann.*

B. COMMUTATA, *Mitten.* (B. patens, *Schwægr.* t. 62.)
Hab. Cameroons Mountain, alt. 12,000 feet, *Mann.*

Much confusion appears to surround this species. Schwägrichen figured it supposing it to be identical with Bridel's *B. patens*, from Magellan; and Bridel then refers to Shwägrichen's figure as representing his species. C. Müller (Synops. i. p. 497) refers it to *B. vulcanica*, Brid., an allied but distinct species with a short seta. Judging from the single perfect capsule on the present specimen, the species differs from *B. patens*, Brid., from Magellan, in the absence of an internal peristome; its leaves are also narrower and more nearly like those of *B. papillata*, Hook. f. et Wils., but they are not serrulate quite down to the shoulders of the vaginant portion, although the papillation is nearly similar.

B. HALLERIANA, *Hedw.*
Hab. Cameroons Mountain, alt. 9000 feet, *Mann.*

PHILONOTIS, *Brid.*

(*Bartramidula*, Bryol. Europ.)

P. WILSONI, *B. et S.*
Hab. Clarence Peak, Fernando Po, alt. 8500 feet, *Mann.*

BREUTELIA, *Schimp.*

B. GNAPHALEA, (Hypnum) *Beauv.*
Hab. Cameroons Mountain, alt. 12,000 feet, *Mann.*
The male flower has obtuse leaves; the fruit is not present.

B. DIFFRACTA, sp. nov. Laxe cæspitosa, caule ramoso, foliis e basi subquadrata superne latiore erecta subito divaricatis diffractisque

longe lanceolatis sensim tenuissime acutis plicatis, marginibus serrulatis, nervo tenui excurrente, cellulis ubique elongatis angustis papillatis, basi ad angulos paucissimis, circiter tribus majoribus fuscis, perichætialibus minoribus e basi ovata lanceolatis levioribus, theca in pedunculo semiunciali horizontali subglobosa plicata gymnostoma, operculo brevi conico.

Hab. Cameroons Mountain, alt. 5000–9000 feet, on rocks, *Mann.*

Differs from *B. gnaphalea* in its leaves having the upper portion suddenly divaricate, the cells in the erect base all narrow and elongate; in *B. gnaphalea* the cells occupying a considerable space on each side of the erect base are shorter and wider than in other portions of the leaf.

This is the first occurrence of a gymnostomous species in this group of Bartramiaceæ.

BRYACEÆ, *Mitten.*

MIELICHHOFERIA, *Hornsch.*

M. OVALIS, sp. nov. Dioica, cæspitosa, caule brevi radiculoso, foliis imbricatis erecto-patentibus ovatis acuminatis integerrimis, rarius apice denticulo uno alterove instructis, nervo percurrente, cellulis laxis teneris, perichætialibus ovato-lanceolatis, theca in pedunculo gracili pallido globoso-pyriformi, operculo conico, peristomio dentibus subulatis pallidis, annulo composito.

Hab. Cameroons Mountain, alt. 10,000 feet, *Mann.*

Stems scarcely half an inch high, in compact tufts of a pale shining yellow. In the form of its capsule allied to *M. Jamesoni*, Taylor, but it is a larger moss.

M. BASILARIS, *B. et S.*

Hab. Cameroons Mountain, alt. 7000–8000 feet, *Mann.*

BRYUM, *Dill.*

(*Bryum.*)

B. JULACEUM, *Sm.*

Hab. Cameroons Mountain, alt. 7000 feet, *Mann.*

A few fragments with an *Anthoceros.*

B. ARGENTEUM, *L.*

Hab. Cameroons Mountain, alt. 8000 feet, *Mann.*

B. ALPINUM, *L.*

Hab. Cameroons Mountain, alt. 12,000 feet, *Mann.*

B. PALLESCENS, *Schwægr.*

Hab. Cameroons Mountain, alt. 7000–12,000 feet, *Mann.*

Specimens fine, and agreeing exactly with European and American states.

(*Brachymenium.*)

B. FLEXIFOLIUM, *B. et S.*

Hab. Cameroons Mountain, alt. 8000 feet, *Mann.*

B. SUBERECTUM, sp. nov. Monoicum, *B. Nipalensi* simillimum, foliis e basi angustiore elliptico-spathulatis acuminatis, nervo in mucronem excurrente, marginibus ubique late cartilagineis a basi ad medium revolutis inde ad apicem remote serratis, cellulis parvis late oblongis, theca in pedunculo elongato inclinata pyriformi sub ore parvo constricta, operculo conico acuminato, peristomio *Brachymenii.*

Hab. Fernando Po, *Mann.*

Closely resembling *B. Nipalense,* but with leaves more narrowed at the base, more broadly marginate. The operculum acuminate, not hemispheric.

B. SUBULIFERUM, sp. nov. Monoicum, laxe cæspitosum, caule subsimplici, foliis laxe dispositis patentibus elliptico-lanceolatis nervo excurrente longe subulatis, marginibus a medio remote serratis, cellulis elongatis ad margines seriebus pluribus angustioribus limbum tenuem concolorem formantibus, theca in pedunculo elongato gracili suberecta pyriformi, peristomio *Brachymenii.*

Hab. Island of St. Thomas, lat. 0, *Mann.*

More nearly allied to *Brachymenium lanceolatum,* Hook. fil. et Wils, than to any yet known African or American species, and agreeing with it in size and general appearance; its leaves are, however, of a different form, having their widest part just above the middle, and thence gradually narrowing into the hair-like point.

HYPNACEÆ, *Mitten.*

FABRONIA, *Raddi.*

F. PERSOONII, *Schwægr.*

Hab. Island of St. Thomas, lat. 0, *Mann.*

Growing on a species of *Physcia* similar or perhaps identical with *P. speciosa.*

HYPNUM, *Dill.*

(*Brachythecium,* Schimp.)

H. VELLEREUM, sp. nov. Dioicum, cæspitosum, caule procumbente ramoso, foliis sericeo-nitentibus teretiuscule imbricatis late ovatis concavis subulato-acuminatis, acumine semitorto, nervo tenui medio evanido, marginibus apicem versus minute serrulatis, cellulis elongatis basi ad angulos parvis concoloribus quadratis, perichætialibus erectis ovato-lanceolatis, theca in pedunculo lævi cylindracea erecta æquali, operculo conico acuminato, peristomio interno processibus angustis perforatis in membrana ad tertiam partem dentium longitudinis exserta, ciliis nullis.

Hab. Cameroons Mountain, alt. 8000 feet, *Mann.* Abyssinia, near Ankober, *Dr. Roler.*

Habit and size similar to that of the more robust states of *H. salebrosum,* Hoffm., but leaves more turgid and faintly plicate. In the erect cap-

sule and incomplete peristome, this species has the same ratio to *H. salebrosum* as *H. sericeum*, L., has to *H. lutescens*, Huds.

(*Eurynchium*, Schimp.)

H. SPICULOSUM, sp. nov. Monoicum, caule laxe cæspitoso fruticoso, pinnatim ramoso, foliis patentibus flaccidis suborbiculari-ovatis acuminatis rameis oblongo-ovatis breviter acuminatis marginibus serrulatis, nervo ultra medium evanido, cellulis elongatis, perichætialibus e basi oblonga erecta subulato-attenuatis patulis, theca in pedunculo elongato spiculoso aspero rubro ovali horizontali, operculo subulirostrato, peristomio interno ciliis singulis inter processibus æquilongis perforatis in membrana ad dentium dimidium exsertis.

Hab. Cameroons Mountain, on trees, *Mann.*

Resembling *H. Swartzii*, Turner, but with more attenuated branches, more flaccid leaves, and removed from its near vicinity by the inflorescence, and thus more nearly agreeing with *H. remotifolium*, Grev., *H. speciosum*, Brid., and *H. austrinum*, Hook. et Wils., all which are more robust and less fruticose.

METEORIUM, *Brid.*

M. SERRULATUM, (Pilotrichum) *Beauv.*

Hab. Fernando Po, *Mann.*

(*Cryptotheca*, Hsch.)

M. INVOLUTIFOLIUM, sp. nov. Caule elongato arcuato pinnatim ramoso, foliis imbricatis patentibus oblongis panduriformibus profunde concavis convolutis obtusis apiculo brevi convoluto terminatis nitidis, enerviis integerrimis, cellulis elongatis basi fuscis, alaribus paucis parvis fuscis obscuris.

Hab. Sierra Leone, *Barter*; also in *Herb. Hooker.* from the same place, given by the Horticultural Society.

Stems three inches long, branches about one inch long, somewhat similar to *M. Vitianum*, Sullivant, but less rigid, and leaves more elongate and obtuse, and the apiculus is shorter.

M. IMBRICATUM, (Pilotrichum) *Beauv.*

Hab. Cameroons Mountain, alt. 4000–7000 feet; Clarence Peak, Fernando Po, alt. 8000 feet, on trees, *Mann.* Sierra Leone, *Barter.*

TRACHYLOMA, *Brid.*

T. STIPITATUM, sp. nov. Ramis erectis dendroideis, stipite elongato, ramulis in fronde obliqua planiuscula dispositis, foliis hastatis compressis subquadrifariis substriatis late ovatis obtusis acutatis plicatis appressis, nervo tenui ad $\frac{3}{4}$ evanido, apice dorso prominente dentiformi, marginibus serrulatis, cellulis elongatis omnibus conformibus, floribus masculis gemmiformibus in ramis primariis secundariisque dispositis.

Hab. Fernando Po, alt. 7500 feet, *Mann.*

Very similar to the larger states of *T. arcuatum*, Hedw., but with the nerve abrupt below the apex of the leaf, and standing out as a small tooth.

STEREODON, *Brid.*

(*Pylaiesia*, Schimp.)

S. ABYSSINICUS, (Leptohymenium) *B. et S.*
Hab. Cameroons Mountain, alt. 7000–8000 feet, on trees, *Mann.*

(*Theca pendula.*)

S. MOLLICELLUS, sp. nov. Dioicus, laxe late cæspitosus, ramis procumbentibus elongatis ramulis brevibus pinnatis, foliis falcatis secundis e basi latiore sensim angustatis lanceolatis, nervis binis fere obsoletis, apice parce serrulatis subintegerrimis, cellulis elongatis angustis, basi ad angulos paucis abbreviatis, foliis ramulinis circinatis integerrimis, perichætialibus elongatis lanceolatis subulatis serrulatis, theca in pedunculo longissimo gracili apice curvato ovali pendula.
Hab. Cameroons Mountain, alt. 4000–5000 feet, *Mann.*

Rather less, but habit and appearance similar to that of *S. ichnotocladus*, C. Müller; leaves of the ramuli more circinate and entire.

S. DIFFUSUS, sp. nov. Dioicus, late laxe cæspitosus, caule elongato depresso ramis brevibus pinnato, foliis compressis subsecundis e basi latiore sensim lanceolatis superne serrulatis nervis subobsoletis, ramulinis ovato lanceolatis, cellulis elongatis basi paucis abbreviatis, alaribus nullis, perichætialibus e basi ovato-lanceolata subulatis serrulatis, theca in pedunculo elongato gracili mutante, urceolata, peristomio magno, interno processibus solidis, ciliis binis subæquilongis interpositis in membrana ad $\frac{3}{4}$ dentium longitudinis exserta.
Hab. Prince's Island; Fernando Po, *Barter.*

Smaller than *S. mollicellus*, but with the same habit; leaves not so much narrowed upwards and serrulate, those of the ramuli not circinate, simply decurved, and also serrulate.

S. SCATURAGINEUS, (Hypnum) *Brid.*
Hab. Banks of the Nunn, and Fernando Po, *Mann*; Prince's Island, *Barter.*

S. BORBONICUS, (Hypnum) *Bel.*
Hab. Banks of the Nunn, *Mann.*

This small but most distinct moss is found intermixed with many other species from these regions.

S. PAPILLOSUS, (Hypnum) *Hornsch.*
Hab. Banks of the Nunn, on charred wood, *Mann.*

After comparison with original specimens from South America, no appreciable difference is observable.

S. PLANUS, (Hypnum).
Hab. Niger, *Vogel.*

S. HOMALOPHYLLUS, sp. nov. Monoicus, cæspitosus, caule vage subpinnato, foliis plano-compressis ovali-oblongis acutis obtusisve enerviis margine uno latere inflexo superne serrulatis, cellulis elongatis levibus alaribus utrinque tribus majoribus, perichætialibus ovato-lanceolatis serrulatis patulis, theca in pedunculo elongato-ovali collo curvato inclinata horizontalive, operculo conico acuminato, peristomio interno processibus solidis, ciliis singulis brevioribus interpositis in membrana ad $\frac{1}{3}$ dentium longitudinis exserta.

Hab. Niger, on roots in a rivulet, *Barter*.

Larger than *S. planus*, (*Hypnum*) Brid.; foliage more compressed, leaves with cells destitute of the papillæ so evident in that species.

(*Plagiothecium*, B. et S.)

S. NITIDIFOLIUS, sp. nov. Monoicus, ramis ascendentibus ramosis, foliis patentibus compressis ovato-lanceolatis plerumque asymmetricis acutis integerrimis, nervis binis brevibus, angulis decurrentibus, cellulis angustis elongatis latitudine circiter $\frac{1}{4000}$, longitudine $\frac{24}{4000}$ uncii metientibus basi paucissimis laxioribus, perichætialibus erectis conformibus, theca in pedunculo gracili brevi ovali inclinata, operculo conico acuto, peristomio interno processibus ciliis binis brevibus interpositis, in membrana fere ad dentium dimidium producta.

Hab. Clarence Peak, Fernando Po, alt. 8000 feet, on trees, *Mann*.

Pale green, shining, in habit and size resembling *S. denticulatus*, Dill., but with leaves more evenly tapering into the more acute point, not acuminate, and cells half as wide, and nearly twice as long as in that species.

(*Hylocomium*, Schimp.)

S. FRUTICELLUS, sp. nov. Monoicus, intricatus, caule erecto inferne simplici superne in frondem bipinnatim ramoso apice descendente radicante prolifero, foliis caulinis remotiusculis patulis hastato-acuminatis substriatis, rameis patentibus hastato-ovatis argutius serrulatis, dorso parce denticulatis, enerviis, cellulis elongatis angustis alaribus nullis, perichætialibus patentibus e basi late ovata subito longe subulatis integerrimis, theca in pedunculo longissimo apice curvato ovali æquali horizontali pendula, operculo brevirostrato, peristomio interno processibus solidis ciliis tribus dimidio brevioribus in membrana ad $\frac{2}{3}$ dentium longitudinis exserta.

Hab. Fernando Po, alt. 3000–8000 feet, *Mann*.

Habit and size that of *S. reptans*, Sw., but distinct in the more lanceolate point of the cauline and wider branch-leaves.

S. FRONDOSUS, sp. nov. Monoicus, intricate cæspitosus, caule superne bipinnato ramulis decurvis, foliis caulinis subsecundis latissime cordato-ovatis apiculo brevi curvato concavis margine hic illic plano minute serrulato, nervis binis teneris brevibus, cellulis elongatis angustis apicibus dorso prominentibus, rameis imbricatis late ovatis acuminatis concavis marginibus planis argute serrulatis, nervis longioribus, cellulis magis prominentibus basi paucis abbreviatis, perichætialibus e basi erecta ovata sensim lanceolato-attennuatis subintegerrimis patulis, theca in pedunculo longissimo rubro ovali inæquali horizontali pendulave, operculo conico longirostrato, peristomio interno processibus solidis ciliis singulis ejusdem longitudinis in membrana ad $\frac{1}{3}$ dentium longitudinis exserta.

Hab. Fernando Po, alt. 3000–8000 feet, on stones up the mountain, *Mann.*

Habit similar to that of *S. fruticellus* and *S. reptans*, but more robust, and approaching small states of *S. tenuis*, (*Neckera*) Hook. The capsule is sometimes regularly plicate, but not uniformly so. Very near to *S. pseudoreptans*, C. Müller, but different in capsule and peristome.

LEPIDOPILUM, *Brid.*

L. **DEVEXUM**, sp. nov. Monoicum, caule parce ramoso, foliis compressis, lateralibus inæqualibus divaricato-decurvis asymmetricis intermediisque ovato-lanceolatis, mediis æqualibus minoribus, nervis ad medium productis, marginibus a medio ad apicem serrulatis paululum recurvis, cellulis longitudine latitudinem duplo superantibus, perichætialibus parvis ovatis acuminatis, theca in pedunculo gracili brevi bilineari rugoso apice flexo horizontali ovali, peristomio dentibus subulatis interno processibus carinatis angustis dentium longitudinis basi in membrana brevi exserta, calyptra sublævi subintegra.

Hab. Cameroons Mountain, alt. 4000 feet, *Mann.*

In size and appearance similar to *L. latifolium*, Müller, and the numerous closely allied South American species; but differing from all in its capsule being horizontal from the curvature of the very short seta, which is rugose, not papillose, and in the calyptra, which is more nearly smooth and entire than is usual in the genus.

L. **VERSICOLOR**, sp. nov. Monoicum, caule depresso ramoso, foliis compressis, lateralibus patulis subarcuatis oblongo-lanceolatis apice latiusculo acutis, mediis intermediisque paulo brevioribus sursum angustioribus acutioribus ad medium binervatis, cellulis oblongis mollibus inferne longioribus, marginibus apice dense serrulatis, perichætialibus brevibus lanceolatis pedunculo elongato gracili sub collo thecæ ovali-cylindraceæ horizontaliter ruguloso, operculo conico acuminato, peristomio interno processibus solidis ciliis nullis.

Hab. Fernando Po, *Mann.*

Near to *L. Utacamundianum*, Mont., but with narrower leaves and smaller cells.

NECKERACEÆ, *Mitten.*

NECKERA, *Hedw.*

(*Climacium*, Mohr.)

N. **LONGIROSTRIS**, *Hook.*

Hab. Cameroons Mountain, alt. 7000 feet.

Very incomplete specimen, but not distinguishable from the South American species.

N. ramulosa, sp. nov. Gracilis, ramis bipinnatis, foliis compressis ovato-oblongis acuminatis ramulinis rotundato-ovatis, nervo ultra medium producto, marginibus a medio ad apicem argute subduplicato serrulatis, cellulis superioribus oblongo-rotundis inferioribus elongatis, perichætialibus apicibus subulatis.

Hab. Cameroons Mountain, alt. 4000 feet, amongst *Radula bipinnata,* Mann.

A slender species allied to *N. flagellacea,* Mitten, but with narrower leaves.

(*Rhystophyllum,* Ehrh.)

N. disticha, *Hedw.*
Hab. Fernando Po, *Mann.*

N. foveolata, *Mitten.*
Hab. Bagroo River, *Mann.*

N. pennata, *Hedw.*
Hab. Peak Clarence, Fernando Po, alt. 6000 feet, on trees, *Mann.*

N. remota, *Bruch.*
Hab. Cameroons Mountain, alt. 7000 feet, on trees, *Mann.*
Agrees exactly with the Abyssinian specimens.

LEUCODONTACEÆ, *Mitten.*

Hedwigia, *Ehrh.*

(*Hedwigium,* Schimp.)

H. imberbis, *Hook. et Taylor.*
Hab. Cameroons Mountain, alt. 10,000–12,000 feet, on rocks, *Mann.*

H. rupestris, sp. nov. Monoica, cæspitosa, caule elongato ramoso, foliis caulinis erecto-patentibus imbricatis ovato-ellipticis acutis apice serrulatis marginibus inferne anguste reflexis longitudinaliter rugosis, rameis in apiculum flexuosum filiformem attenuatis, cellulis minutis rotundatis, perichætialibus erectis longioribus ovato-lanceolatis plicatis, theca in pedunculo semiunciali gracili late ovali pluries plicata, ore levi, operculo conico, rostro subulato, calyptra elongata bi- trifida uno latere profundiore pluries plicata.

Hab. Cameroons Mountain, alt. 10,000 feet, on rocks, *Mann.* "Ad rupes prope Enschedcap," inter cæspites *H. Schimperianæ,* No. 464, *Unio Itineraria,* 1842, *Schimper.*

Size about that of *H. Indica,* Mont., but in all the specimens less regularly branched; easily distinguished from *H. Schimperiana* by its more acute leaves and plicate capsule.

LESKEACEÆ, *Mitten*.

LESKEA, *Hedw.*

(*Thuidium*, Schimp.)

L. INTRICATA, sp. nov. Monoica, intricate cæspitosa, caule phyllidiis brevibus sparsis, foliis patentibus latissime hastatis subulatis acuminatis minute serrulatis, nervo tenui in apice evanido, rami nudi, foliis hastato-ovatis acutis ramulinisque compressis ovatis obtusiusculis apiculo brevi, cellulis parvis rotundatis subobscuris papillis brevibus nervo sub apice evanido, perichætialibus erectis ovato-lanceolatis subulatis subintegerrimis lævibus, theca in pedunculo lævi elongato cylindracea subæquali suberecta, operculo subulirostrato, peristomio interno processibus elongatis in membrana brevi exserto, ciliis nullis.

Hab. Cameroons Mountain, alt. 7000 feet, on trees, *Mann.*

Allied to *L. Haplohymenia*, Hook, and to *L. leptoclada*, Taylor.

L. RAMUSCULOSA, sp. nov. Monoica, caule phyllidiis sparsis, foliis cauli latioribus latissime cordato-hastatis acuminatis, margine inferne planis superne crenulatis, nervo in apice evanido, ramis nudis, foliis late ovatis acutis, ramulinis ovatis obtusiusculis nervo sub apice evanido marginibus minute crenulatis, cellulis rotundatis obscuriusculis breviter papillosis, perichætialibus erectis e basi suboblonga superne dentato-lacera acumine subulato elongato serrulato, theca in pedunculo lævi elongato rubro horizontali cylindracea inæquali, peristomio interno processibus ciliis tribus interpositis in membrana ad $\frac{1}{3}$ dentium longitudinis producta.

Hab. Clarence Peak, Fernando Po, *Mann.*

Larger than *L. versicolor,* Hsch., and different from any described species, with monoicous inflorescence in the laceration of its perichætial leaves; among the dioicous species this character is frequently observable.

CALLICOSTELLA, *Mitten.*

C. AFRICANA, *Mitten.*

Hab. Fernando Po, *Mann.*

C. ABRUPTA, sp. nov. Dioica?, caule prostrato intricato gracili rigido, foliis oblongo-ovatis apice truncatis, nervis brevibus ad $\frac{1}{4}$ folii longitudinis productis, marginibus crenulatis, cellulis elongatis papillosis, perichætialibus oblongo-ovatis acutis, theca in pedunculo elongato cygnicolli flexu superne scabro ovali collo sensim attenuato pendula, operculo conico curvirostrato, peristomio interno processibus ciliis singulis brevioribus interpositis.

Hab. Fernando Po, *Mann.*

Less than its allies *C. cymbifolia,* Hampe, and *C. pallescens,* Hook. et Wils., but agreeing with them in the shortly nerved leaves.

Rhacopilum, *Brid.*

R. mucronatum, *Beauv.*
Hab. Fernando Po, *Barter.*

R. Africanum, sp. nov. Dioicum, habitu staturaque *R. tomentosi,* foliis lateralibus ovalibus, nervo in mucronem excurrente, marginibus serrulatis, cellulis oblongis rotundisque distinctis viridibus, tegminalibus parvis e basi hastata subulatis serrulatis cellulis minoribus, perichætialibus teneris e basi latiore subito subulatis integerrimis, theca in pedunculo elongato trigono inclinata subhorizontali elongata plicata ore obliquo, operculo subulato rostrato, peristomio magno normali, calyptra pilosa dimidiata.
Hab. Cameroons Mountain, alt. 7000 feet, *Mann.*

Rather larger, but nearly resembling *R. tomentosum,* Schw. Capsule longer, and inflorescence different.

MNIACEÆ, *Mitten.*

Fissidens, *Hedw.*

F. viridulus, *Schw.*
Hab. Cameroons Mountain, alt. 7000 feet, on rocks, *Mann.*

F. microcarpus, sp. nov. Monoicus, caule ramoso, foliis patentibus late lanceolatis obtusiusculis subundulatis, nervo pellucido sub apice evanido, lamina folii vera ad medium producta æquali, dorsali basi contracta non decurrente, omnium laminarum marginibus tenuissime crenulatis, cellulis distinctis diametro circiter $\frac{1}{3000}$ unciæ metientibus, theca in pedunculo gracillimo pallido minute ovali tenera erecta æquali, operculo subulato, peristomio dentibus brevibus subintegris dicranisque, calyptra mitriformi subscabra.
Hab. Banks of the Nunn, in large patches on bark, *Mann.*

Very near to *F. sciophyllus,* Mitten; but leaves more obtuse, not obscure; cells easily distinguished; capsule quite symmetric.

Rhizogonium, *Brid.*

R. spiniforme, *L.*
Hab. Fernando Po, *Mann.*

Mnium, *Dill.*

M. rostratum, *Schw.*
Hab. Fernando Po, *Mann.*

Daltonia, *Hook. et Tayl.*

D. patula, sp. nov. Monoica, foliis patentibus late lineari-lanceolatis nervo ad $\frac{3}{4}$ evanido carinatis, margine e serie triplici cellularum elongatarum integerrimo, cellulis omnibus parvis rotundato-ovalibus pellucidis latitudine circiter $\frac{1}{3000}$ longitudine $\frac{6}{3000}$ unciæ metientibus, peri-

chætialibus parvis ovatis, theca in pedunculo rubro-fusco papilloso inclinata obovata, operculo subulato longi-rostrato, calyptra fimbriata.

Hab. Clarence Peak, Fernando Po, alt. 7000 feet, with *Neckera pennata*, Hedw., *Mann.*

Similar to *D. marginata*, Griff., and to *D. ovalis*, Tayl. Cells small and short.

D. LONGINERVIS, sp. nov. Monoica, foliis patentibus siccitate substrictis angustis lanceolatis nervo sub apice evanido carinatis, margine e serie superne quadruplici inferne latiore cellularum elongatarum integerrimo, cellulis superioribus latitudine circiter $\frac{1}{4000}$ longitudine $\frac{3}{2000}$ unciæ metientibus, inferioribus elongatis angustis, theca in pedunculo brevi rubro-fusco superne papilloso ovali ad medium papillosa, operculo subulato rostrato, calyptra fimbriata.

Hab. Fernando Po, with *Lepidopilum devexum*, Mann.

Like *D. angustifolia*, Dzy. et Molk., but with the cells at the base of the leaf much longer; it is a larger species than *D. splachnoides.*

D. SPLACHNOIDES, *Hook. et Tayl.*

Hab. Clarence Peak, Fernando Po, with *Stereodon nitidifolius*, Mann.

Two or three stems only, which appear to correspond with the Irish species.

DISTICHOPHYLLUM, *Dzy. et Molk.*

D. PROCUMBENS, sp. nov. Monoicum, caule brevi procumbente, foliis lateralibus patentibus late spathulatis apice rotundatis, intermediis erecto-patentibus mediisque erectis oblongo-spathulatis, omnibus apice apiculo parvo terminatis, margine tenui limbatis, nervo tenui ultra medium evanido, cellulis superioribus rotundatis diametro circiter $\frac{1}{1000}$ unciæ metientibus, inferioribus oblongis, perichætialibus parvis obtusis, theca in pedunculo bilineari aspero minuta globoso-ovali collo elongato horizontali, operculo e basi conica tenui longe subulato, calyptra basi longe fimbriata.

Hab. Fernando Po, *Mann.*

Stems about half an inch high; leaves pale yellowish green, becoming brown in age. Nearly allied to *D. spathulatum*, Dzy. et Molk.

Mniadelphus, C. Müller, must give place to *Distichophyllum*, on account of its priority.

CYCLODICTYON, gen. nov.

Caulis repens, ramosus. *Folia* binervia, cellulis rotundis lævibus. *Fructus* lateralis. *Calyptra* mitriformis.

C. LÆTEVIRENS, (Hookeria) *Hook. et Tayl. Muscol. Brit. et auctorum.* Pterygophyllum ex parte, *Bridel.*

Hab. Clarence Peak, Fernando Po, alt. 8000 feet, on trees, *Mann.*

This genus is proposed to include a small group of species, all closely agreeing in habit and structure with *C. lætevirens.* They differ from the *Hookeria* founded by Smith on *H. lucens*, and from *Lepidopilum*, Schw., in the large rounded cells of their leaves. In this particular they agree with that group of species which correspond with the *Hookeria quadrifaria*, Hook. Musc. Exot. t. 109, and which have been described in the Antarctic Floras under Bridel's genus *Pterygophyllum*; but the habit is different and the entire appearance of the plants dissimilar.

HYPOPTERYGIACEÆ, *Mitten.*

HYPOTERYGIUM, *Brid.*

H. **LARICINUM**, *Hook.* (*quoad specimina Menziesiana*).
Hab. Fernando Po and Island of St. Thomas, *Mann.*
The inflorescence of this species is monœcious.

POLYTRICHACEÆ, *Schimp.*

POLYTRICHUM, *Dill.*

(*Cephalotrichum*, B. et S.)

P. **SIMENSE**, *B. et S.*
Hab. Cameroons Mountain, alt. 8000–10,000 feet, on the ground, *Mann.*

(*Eupolytrichum.*)

P. **JUNIPERINUM**, *Hedw.*
Hab. Cameroons Mountain, alt. 8000–10,000 feet, *Mann.*

P. **COMMUNE**, *L.*
Hab. Clarence Peak, Fernando Po, on the very summit, *Mann.*

HEPATICÆ.

JUNGERMANNIA, *L.*

J. **DENTATA**, *Raddi.*
Hab. Cameroons Mountain, alt. 7000 feet, *Mann.*

J. **HIRTELLA**, *Weber.*
Hab. Cameroons Mountain, alt. 7000 feet, amongst *Dicranum ericetorum*, Mann.

J. **ABYSSINICA**, *Nees ab E.*
Hab. Cameroons Mountain, alt. 7000 feet, *Mann.*

J. **GEMINIFOLIA**, sp. nov. Caule gracili repente, foliis oppositis directione divergentibus devexisque convexis ambitu ovatis obtusis, margine dorsali subrecto ventrali magis arcuato apice rotundato basi dorso ventreque connexis, cellulis grossiusculis intercalaribus distinctis.
Hab. Island of St. Thomas, creeping on *Sendtnera diclados*, Endl., *Mann.*

Very closely resembling *J. perfoliata*, Sw., in size, but apparently different in its more closely inserted leaves, which are more divaricate and more unequal-sided.

PLAGIOCHILA, *Nees et Mont.*

P. SQUAMULOSA, sp. nov. Ramis elongatis subpinnatim ramosis apice decurvis, foliis patentibus imbricatis subdeltoideis apice obtusis, margine dorsali inferne integerrimo recurvo arcuato apice totoque marginis ventralis denticulato, ubi in caule descendente crispulo squamulis amphigastriiformibus varie lacerulis, cellulis rotundatis æqualibus, perianthio obovato dorso alato, labiis rotundatis denticulatis, foliis involucralibus latioribus undulatis argutius dentatis.

Hab. Cameroons Mountain, alt. 7000–8000 feet, *Mann.*

Resembles *P. corrugata*, Nees ab E.; but the leaves are more rigid, undulated only at the base, and the margin more strongly toothed.

P. DICHOTOMA, *Nees ab E.*

Hab. Cameroons Mountain, alt. 4000 feet, *Mann.*

LEIOSCYPHUS, *Mitten.*

L. REPENS, sp. nov. Caule repente ramoso radiculoso, foliis explanatis late ovato-subrotundis apice rotundatis sinuve obtuso bidentatis basi cum amphigastrio sinu lato bidentato, dentibus intus uni- extus bi-denticulato uno latere coalitis, cellulis rotundatis limitibus tenuibus, intercalaribus distinctis, foliis involucralibus magis rotundatis apice subbidentatis basi saccatis, amphigastrio caulinis majore magis dentato, perianthio basi turgido apice compresso lævi, labiis breviter dentatis.

Hab. Clarence Peak, alt. 8000 feet, Fernando Po, on decayed wood, *Mann.*

Entire plant, including the peduncle and rootlets, dark brown. In size similar to *Lophocolea heterophylla*, Nees ab E.

LOPHOCOLEA, *Nees ab E.*

L. DEVEXA, sp. nov. Caule elongato parce ramoso, foliis sursum conniventibus directione (explanatis) devexis ovatis ovato-oblongisque margine ventrali rectiusculo integerrimo dorsali arcuato basin versus uni- bidentato, amphigastriis satis magnis late ovatis apice breviter bidentatis lateribus utrinque angulato-bidentatis, cellulis subrotundis, interstitiis grossis.

Hab. Island of St. Thomas, creeping on *Sendtnera diclados*, Endl., *Mann.*

Resembling very nearly *L. trapezoides* (*Chiloscyphus*), Nees ab E., but leaves more narrow.

L. COADUNATA, *Sw.*

Hab. Prince's Island, *Barter.*

L. BIDENTATA, *Nees ab E.*

Hab. Clarence Peak, Fernando Po, alt. 8000 feet, on trees, *Mann.*

L. MURICATA, Nees ab E.

Hab. Clarence Peak, Fernando Po, alt. 8000 feet (a few fragments only), *Mann.*

GYMNANTHE, *Tayl.*

G. DECIPIENS, (Jungermannia) *Hook.*

Hab. Peak Clarence, Fernando Po, alt. 8000 feet, *Mann.*

The habit and structure of this species seem to bring it more nearly to this genus than to *Plagiochila*, to which it was referred in the 'Synopsis Hepaticarum.'

G. BILOBA, sp. nov. Caule procumbente radiculoso apice sæpe stolonifero descendente curvato, foliis sursum conniventibus explanatisve, subobcordatis bilobis sinu subrectangulo lobis subovatis acutis rarius trilobis, cellulis rotundatis interstitiis crassiusculis.

Hab. Clarence Peak, Fernando Po, alt. 8000 feet, *Mann.*

Smaller than the preceding species and more creeping, but appearing to belong to the same genus.

LEPIDOZIA, *Nees ab E.*

L. SUCCIDA, *Mitten.*

Hab. Fernando Po, *Mann.*

PHYSIOTIUM, *Nees ab E.*

P. SPHAGNOIDES, *Hook.*

Hab. Island of St. Thomas, *Mann.*

SENDTNERA, *Nees ab E.*

S. JUNIPERINA, *Sw.*

Hab. Island of St. Thomas, *Mann.*

S. DICLADOS, *Endl.*

Hab. Fernando Po, *Mann.*

RADULA, *Nees ab E.*

R. BIPINNATA, sp. nov. Ramis elongatis bipinnatis rigidis ramulis divergentibus, foliis laxe imbricatis suborbiculatis apice obtusis obtuso-angulatisve lobulo parvo cauli transverse appresso basi auriculo latiusculo rotundato infra punctum insertionis descendente ambitu cordato angulo superiore obtuso, cellulis minutis rotundatis subobscuris, perianthio in ramis laterali parvo brevi labiis undulatis, capsula emergente.

Hab. Cameroons Mountain, alt. 4000 feet, *Mann.*

Branches three to four inches long, slender, and rigid. Perianth remarkably small.

R. TAMARISCINA, sp. nov. Caule gracili rigidulo ramis divergentibus bipinnato, foliis divergentibus late ovatis apice rotundatis lobulo parvo subquadrato rectangulato basi trans caulem protracto, cellulis parvis rotundatis.

Hab. Island of St. Thomas, on *Physiotium sphagnoides*, Hook., *Mann.*

A small brown species, agreeing in size, appearance, and ramification with *Frullania tamarisci*, N. ab E.

R. VOLUTA, *Tayl.*
Hab. Cameroons Mountain, alt. 8000 feet, *Mann.*

MADOTHECA, *Dumort.*

M. SUBDENTATA, sp. nov. Ramis dense pinnatim ramosis, foliis divergentibus oblongis margine ventrali paulo sinuatis apice denticulatis, lobulo oblongo spinuloso dentato basi auriculato, amphigastriis breviter ovatis apice denticulatis, perianthio ovato apice truncato ore dentato.
Hab. Cameroons Mountain, alt. 4000 feet, *Mann.*

Differs from *M. capensis*, Gottsche, in the denticulate leaves, lobule, and amphigastrium, and smaller cells. In size near to *M. platyphylla.*

LEJEUNIA, *Gottsche et Ldbg.*

(*Thysananthus*, Ldbg.)

L. TRIQUETRA, sp. nov. Caule dichotomo subpinnatove ramoso, foliis ovatis apice angulo subrecto acutis dentatis, margine dorsali subrecto, ventrali incurvo arcuato, lobulo parvo oblongo bidentulo, amphigastriis obovatis apice emarginatis subdentatis marginibus inferne recurvis, cellulis parvis ovali-rotundis, foliis involucralibus majoribus apice obtusioribus magis dentatis, amphigastrio magno apice dentato, perianthio triquetro angulis superne dentatis.
Hab. Bagroo River, on bark, *Mann.*

Similar in size and appearance to *L. spathulistipa* (*Thysananthus*), Ldbg.; but leaves more obtuse, less sharply toothed, and the lobule bidentate.

(*Phragmicoma*, Dumort.)

L. PAPPEANA, (Phragmicoma) *Nees ab E.*
Hab. Fernando Po, *Mann.*

L. ABBREVIATA, sp. nov. Cæspitosa depressa, ramis brevibus subsimplicibus, foliis decurvis oblongis apice rotundatis margine ventrali sinuatis basi lobulo parvo oblongo unidentato, cellulis parvis rotundatis, amphigastriis parvis oblatis suborbiculatisve integerrimis, foliis involucralibus conformibus, perianthio subterminali obovato compresso dorso uni- ventre bi-carinato, angulis lævibus.
Hab. Bagroo River, on bark, *Mann.*

A small brownish-green species, with branches about three lines long and scarcely a line wide. It resembles in form *L. Sagræana*, Mont., and *L. adplanata*, but is more rigid.

L. MONTAGNEI, *Gottsche.*
Hab. Island of St. Thomas, on *Sendtnera diclados*, Endl., *Mann.*

(*Lejeunia*, G. et L.)

L. ACUTA, sp. nov. Caule repente elongato ramoso, foliis patulis ovatis

acuminatis acutis, cellulis rotundis pellucidis, lobulo parvo saccato unidentato, amphigastriis rotundo-ovatis sinu angusto laciniis conniventibus acutis, foliis involucralibus conformibus, perianthio parvo terminali obovato superne quinquangulato carinis sublævibus.

Hab. Fernando Po, on lichens, *Mann.*

Pale yellow. Similar to *L. cerina*, L. et L., and its allies.

(*Acrogonia*, Mitt.)

L. CULTRELLA, sp. nov. Epiphylla maculas astroideas formans, foliis patentibus ambitu subellipticis margine dorsali arcuato subintegerrimo ventrali dentato subintegerrimove dente uno validiore supra apicem lobuli oblongi apice rotundati, amphigastriis ad basin in lacinias duas angustas divergentes divisis, perianthio suboblongo angulis brevibus acutis divaricatis, foliis involucralibus inæqualiter bilobis subdentatis amphigastrio oblongo breviter bidentato.

Hab. Cameroons River, on leaves, *Mann.*

Nearly allied to *L. cupulata*, Tayl., and resembling it in the form of the leaves, which are, however, less narrowed upwards, and the lobule is more oblong.

FRULLANIA, *Raddi.*

F. EMERGENS, sp. nov. Caule procumbente vage subpinnatim ramoso, foliis imbricatis suborbiculatis apice incurvis, auriculo galeato compresso appendiculo magno descendente lævi, amphigastriis orbiculatis basi cordatis magnis breviter emarginatis, marginibus incurvis planiusculis, fructu terminali, foliis involucralibus cum amphigastrio coalitis apice paucidentatis, perianthio vix emergente oblongo acuminato compresso pluricarinato, carinis apice subundulatis.

Hab. Cameroons Mountain, alt. 8000 feet, *Mann.*

Closely allied to *F. Mundiana*, Ldbg. et G., and *F. hians*, L. et L., but more robust, scarcely pinnate, leaves more orbicular, amphigastria not undulated.

F. DEPRESSA, sp. nov. Caule procumbente vage pinnato, foliis imbricatis oblongo-orbiculatis apice incurvis, lobulo galeato compresso, appendiculo infra basin non producto, amphigastriis imbricatis rotundatis basi paulo angustioribus breviter emarginatis, marginibus incurvis, involucralibus cum amphigastrio oblongo subligulato breviter bifido coalitis apice acutis integerrimis, perianthio oblongo apiculato exserto compresso, dorso lævi, ventre bicarinato.

Hab. Cameroons Mountain, alt. 8000 feet, *Mann.*

Approaches more nearly to *F. gibbosa*, Nees ab E.; but the margin of the leaf does not descend below the lobule, and the amphigastria are different.

F. CORDATA, sp. nov. Ramis gracilibus rigidis strictis pinnatis ramulis brevibus patulis recurvis parce ramosis, foliis caulinis subdivergentibus suborbiculatis obtusis mucrone parvo incurvo basi cordato-auriculatis, marginibus integerrimis incurvis, lobulo parvo elongato cauli contiguo ad medium evoluto amphigastriis suborbiculatis basi cordatis appressis ad medium fere bifidis laciniis acutis marginibus ubique recurvis tecto, cellulis apice foliorum parvis rotundis medio oblongis ad insertionem majoribus hexagonis omnibus crasse limbatis, perianthio compresso dorso lævi ventre unicarinato, foliis involucralibus lobis oblongo-lanceolatis dentato-laceris.

Hab. Cameroons Mountain, alt. 8000 feet, *Mann.*

In size and habit allied to *F. cordistipula,* Nees ab E. The lobule in the ramuli more remote from the stem, and not covered by the amphigastrium.

F. ANGULATA, sp. nov. Ramis gracilibus flexuosis rigidis, ramulis remotis elongatis simplicibus pinnatis, foliis directione patentibus cauli involutis ovatis acutis, marginibus angulis obtusis subdentatis, cellulis rotundis intercalaribus distinctis basi paucis majoribus, lobulo angusto evoluto cauli contiguo, amphigastriis oblongis bifidis sinu laciniisque acutis marginibus recurvis medio carinatis basi auriculis parvis cordatis, perianthio compresso dorso lævi ventre unicarinato, foliis involucralibus amphigastrioque laciniis lanceolatis angulosis.

Hab. Cameroons Mountain, alt. 8000 feet, *Mann.*

Very near to *F. atrata,* N. ab E., but leaves more ovate and angulate.

F. SQUARROSA, *Nees ab E.*

Hab. Prince's Island, *Mann.*

PLAGIOCHASMA, *L. et L.*

P. AITONIA, *Ldbg. et Nees.*

Hab. Cameroons Mountain, alt. 7000 feet, *Mann.*

DUMORTIERA, *N. ab E.*

D. HIRSUTA, *Schw.*

Hab. Cameroons Mountain, alt. 4000 feet, Fernando Po, *Mann.*

TARGIONIA, *Raddi.*

T. HYPOPHYLLA, *L.*

Hab. Cameroons Mountain, alt. 7000 feet, with *Plagiochasma Aitonia,* Mann.

DENDROCEROS, *N. ab E.*

D. CRISPATUS, *N. ab E.*

Hab. Island of St. Thomas, *Mann.*

ANTHOCEROS, *Micheli.*

A. DICHOTOMUS, *Raddi.*

Hab. Cameroons Mountain, alt. 7000 feet, *Mann.*

Letter from W. ARCHER, Esq., F.L.S., to Sir W. J. HOOKER, F.R.S., &c., on Tasmanian Tree Ferns.

[Read Nov. 19, 1863.]

Cheshunt, Deloraine, Tasmania,
September 22, 1863.

MY DEAR SIR WILLIAM,—I fully intended to write to you a long letter by this post, giving you information upon various points which I thought might prove interesting to you. The arrival of a visitor, to whom I had to give up most of my leisure, has deprived me, however, of the time which I should have devoted to the letter to you. I must therefore content myself with a brief account of the very remarkable fern trees which grow on the northern side of the mountain called Cumming's Head (or more properly Cummings's Head), on land adjoining my estate.

In the midst of a damp forest of gum-trees of various species, and among trees of the genera *Pomaderris*, *Pittosporum*, *Eurybia*, &c., are to be found many fern trees of the genus *Dicksonia*—the *Dicksonia antarctica* being the species growing there. Many of them have more than one crown; but there is one fern tree in particular, round the circumference of whose top I *counted* no fewer than nineteen crowns, and I calculated that within the circumference there must be half as many more, making about twenty-eight or twenty-nine crowns in all. I considered this the most wonderful fern tree in the world when I first saw it, and roughly estimated the number of crowns at fifteen or sixteen. Now I am satisfied that it is one of the wonders of the world. Well do I remember the smile of incredulity with which many Fellows of the Linnean Society at one of the meetings received my statement that I had seen a fern tree with ten crowns (for I heartily dislike exaggeration); but I hope that my excellent friend your son will take an opportunity of confirming my statement by my account written on the spot.

Strange to say, there is another fern tree of the same species near the former one, round the circumference of whose top I counted, just the other day, seventeen crowns, which would give a total of twenty-five. There are also two others within twenty or thirty yards of it, the one with seven and the other with six crowns. The fern tree with twenty-five crowns is a very singular one; for it seems to have been originally about sixteen feet high, and to have fallen, and broken at a height of nine feet from the ground, and then to have shot up straight from the fracture. It now stands about eight or nine feet high. W. ARCHER.

Memorandum on a presumed case of Parthenogenesis in *Zanthoxylum alatum*, Roxb. By Daniel Hanbury, Esq., F.L.S.

[Read Nov. 19, 1863.]

In January last Dr. Anderson brought under the notice of the Linnean Society a presumed case of parthenogenesis in a species of *Aberia*, a shrub of which, in the Botanic Gardens of Calcutta, bore a large crop of well-ripened fruits containing fertile seeds, though only pistilliferous flowers could be detected at the time of flowering.

A case of similar character has come under my own notice: an Indian species of *Zanthoxylum*, the *Z. alatum* of Roxburgh, a diœcious plant, flowered in my father's garden at Clapham in the spring of 1862. As I had examined the flowers without being able to detect stamens, and knew that no other plant of the same genus grew near, I was not a little surprised to find the ovaries swell and the berries attain their full development,—and still more so when, having carelessly placed three or four seeds in a pot of earth, a seedling *Zanthoxylum* made its appearance.

In the spring of this year the shrub, now removed from the conservatory to the open border, again flowered, and though subjected to a much more careful scrutiny than previously, I failed to discover upon it any other than pistilliferous flowers. Still the ovaries became enlarged, and the shrub again bears mature berries, some of which I now exhibit to the Society.

On the Plants of the Temperate Regions of the Cameroons Mountains and Islands in the Bight of Benin; collected by Mr. Gustav Mann, Government Botanist. By J. D. Hooker, M.D., V.P.R.S. & L.S.

[Plate I.]

[Read Nov. 5, 1863.]

The last few years have been fruitful in contributions to our knowledge of the botany of the least known, and in the present state of science, most interesting portion of the globe, namely the interior and mountains of tropical Africa. The collections of

Welwitsch in Loanda, of Kirk and Meller during Livingstone's Expedition, of Vogel and Petherick in the White Nile region and Nubia, of Baikie and Barter in the Niger Valley, of Speke and Grant in their arduous journey through Eastern tropical Africa, and lastly of Gustav Mann on the shores, islands, and mountains of the Bight of Benin, are all of great extent, and abound in novelty and interest.

It is with the highest satisfaction that we have lately welcomed amongst us the first-named of these adventurous explorers, Dr. Welwitsch, who is charged by the King of Portugal with a mission to this country for the purpose of preparing his collections for publication; and it only remains for us to hope that the exertions now being made by Sir W. Hooker to induce the British Government to follow the example of His Majesty of Portugal, in securing the publication of our own collections, will be successful, and that the botanical results of so many expeditions, brought together at such great cost and at so great a sacrifice of life, may not be doomed to lie unpublished in our museums for want of the trifling sum requisite for rendering them available to science.

It is with the collections of Mr. Mann that I now propose to occupy the attention of the Society; and with but a small portion of them; for the general collection, amounting to several thousand species, would take many months of continuous labour to investigate fully and report upon. The whole of these, however, having been transmitted to Kew, partly by Earl Russell as Chief Secretary for Foreign Affairs, under whose auspices Mr. Mann first went to Africa, and partly by the Lords of the Admiralty, under whom his latter explorations were conducted,—I have felt it to be my duty to lay before this Society, with the least possible delay, an account of those portions of them which are most novel and interesting. These are, the forms of the temperate mountain-regions explored.

In the sixth volume of our Journal, the Society printed a brief account of the collections made by Mr. Mann in the upper regions of the lofty peak (Clarence Peak) which crowns the Island of Fernando Po, which I had the honour of laying before them. The very great interest of that Florula rendered it in the highest degree desirable that Mr. Mann should completely explore all those mountains of the Bight of Biafra, both insular and continental, which rise into the temperate region, and especially the Cameroons Peaks, which had never been ascended by any European, and which Mr. Mann, from the period of his first arriving on the coast of Africa, had resolved to scale at all hazards. The great scientific importance of the expedition having been represented by Sir W. Hooker to the Duke of Somerset, First Lord of the Admiralty (to which department of the Public Service Mr. Mann had then been transferred), thanks to that nobleman's enlightened views and to the late lamented Admiral Washington's recommendations, the necessary funds were provided; and in this as in his other expeditions Mr. Mann's exertions have been crowned with far greater success than has been the lot of any previous explorer of the West-African coast, Dr. Welwitsch alone excepted. It is not my purpose here to enter into any detail of the many difficulties and dangers, the privations, and all but fatal fevers that Mr. Mann, in common with every other explorer of the shores of the Bights of Benin and Biafra, has encountered; by prudence, temperance, and energy all have been successfully combated; and he has returned to this country, after upwards of three years' continuous journeyings in the most fatal climates in the world, in excellent health, and with the finest collections, whether as regards extent, or interest, or excellent preservation, that have ever been made in those regions.

Before proceeding to an account of the mountain plants collected, it is expedient to enumerate the localities and their elevations, and to record the dates, &c. of the several expeditions during which they were gathered.

Peak of Fernando, elevation 9469 ft. First ascent attempted on the east side, February 21st, 1860; reached 2000 ft. and was driven back by the natives. Second ascent, from the north side, commenced March 22nd; reached the summit April 3rd; descended April 13th. November 7th, attempted a third ascent; but on the 23rd, being deserted by his servants, descended. December 7th, made a fourth attempt, and reached the summit for the second time on the 5th; descended on the 21st. March 19th, 1862, started for the fifth time to ascend the Peak, reaching the summit for the third time; returned on the 25th March, after measuring the depth of the great crater on the summit (515 ft.). April 12th, 1862, made the sixth ascent; reached the summit on the 16th, and descended on the 23rd. March 5th, 1863, made the seventh ascent, reached the summit on the 8th, and descended on the 13th.

St. Thomas's Island was visited August 5th, 1861. On the 13th commenced the ascent of the Peak, whose summit (alt. 7500 ft., according to the Admiralty charts) was reached on the 22nd; left on the 26th. The loftiest part of the island consists of a very narrow ridge, and is accessible with great difficulty from the east side, from which side Mr. Mann attempted it. A species of *Podocarpus* was the most remarkable discovery. Robert Brown having long ago remarked the absence of Coniferæ in West tropical Africa, this discovery was of especial interest. The species is very nearly allied both to a Cape and to an Abyssinian one. Here also the magnificent *Musa Sapientum* var. *vittata* was discovered in a cultivated state, and living specimens sent to Kew (see Bot. Mag. t. 1510–1513). It is, according to Mr. Mann, a native of the Gaboon.

Prince's Island was visited on September 22nd, and left on October 26th.

Cameroons Mountains.—This noble group attains 13,100 ft. of elevation, and consists of many peaks, all of volcanic origin, crowning an irregular short littoral range. Some of the physical characters of the group have been described in a memorandum transmitted to the Secretary of State for Foreign Affairs by Consul Burton, who accompanied Mr. Mann on his second visit to this group. The account there given of this adventurous expedition seeming to imply that it was one planned and conducted by Consul Burton, to which Mr. Mann had attached himself, I have been desired by Mr. Mann to publish the accompanying statement of the facts of the case as communicated by himself:—

"January 7th, 1861.—Having been instructed to use every exertion to explore the Cameroons Mountains, I arrived at Ambas Bay * (the foot of the range), on a reconnoitring expedition, hoping to ascend if possible, but chiefly with the view of making arrangements for ascending at an earlier period during the following season. February 10th, ascended the mountains to the highest villages, Makunda and Bando; elevation about 2500 ft.; but being under orders to repair to the Bagroo River, to report on its timbers for the Admiralty, before the wet season set in, I was obliged to descend, having arranged to revisit the mountain in the ensuing season.

"December 13th, 1861, I left Victoria, the Baptist Missionary station, in Ambas Bay, and reached Bassumba, alt. 1119 ft. On the 15th arrived at Mapanya, alt. 2748 ft.; on the 17th camped at a spring at the base of the Peaks, above the forest, at 7376 ft. On the 18th ascended to the summit of one of the highest peaks (Mount Helen), alt. 9290 ft., and returned to Mapanya, where I was met on the following day by Mr. Saker, Signor Calvo, and Consul Burton, who, having followed me up the mountain, now joined my expedition. December 24th, again visited Mount Helen. January 3rd, 1862, reached the summit of the Cameroons Mountains—Mount Albert, alt. 13,100 ft., which had never before been visited by a European; was taken ill on the descent, and had to be carried down to Victoria. January 24th, again left Victoria for the mountains, and reached the top of Mount Victoria, alt. 12,861 ft., on the 29th, Mount Albert (my second visit), and Mount Hooker. On January 31st, Consul Burton descended, leaving me: I continued my explorations till February 18th.

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* "This was nine months before Consul Burton arrived on the coast of Africa."

"November 8th, 1862, left Victoria for a third expedition on the mountains, visited the summit twice, and returned to Victoria December 15th. On this occasion I examined the 'Burning Field' described by Consul Burton in his Report printed by the Foreign Office, and found the appearance to be caused by steam issuing from the ground, at an elevation of 12,967 ft. above the sea. December 30th, ascended Mount Etindet, alt. 5309 ft."

From Mr. Mann's descriptions, the Cameroons Mountains present a dense forest-region up to about 7000 ft., when open grassy fields succeed, with bushes of *Hypericum*, *Pittosporum*, *Adenocarpus*, *Pygeum*, *Leucothoë*, *Ericinella*, *Myrica*, and various herbaceous plants. The many peaks which rise above this elevation are either stony and barren (being all formed of lava scoriæ or basalt), or are dotted with tufts of grass and a few other herbaceous plants.

The most interesting plants from the highest summits are, *Umbilicus pendulinus*, *Silene*, *Trifolium*, *Galium Aparine* and *G. rotundifolium*, *Scabiosa succisa*, *Helichrysa*, *Veronicæ*, *Bartsia*, *Stachys*, *Trichonema Bulbocodium*, *Deschampsia cæspitosa*, *Poa nemoralis*, *Kœleria cristata*, and various other European and even British plants.

Sierra del Crystal.—This appears to be a low range of hills, nowhere exceeding 2000 ft. elevation, whose importance and altitude have, according to Mr. Mann, been much overrated by M. du Chaillu. On June 7th, 1862, Mr. Mann reached the Gaboon River, and on the 12th arrived at Corisco Bay (Ilobi Island). On the 4th July left Corisco for the interior hills; on the 13th reached the summit of Mount Maveya, alt. 1668 ft., erroneously supposed to be 5000 ft. high and the summit of the chain. The true summit is Mount Shomba, alt. 1767 ft. On the 28th, having crossed the Sierra, he reached the village of Mangetsi, about eighty miles in a straight line from the coast.

Mr. Mann desires publicly to express his great obligations to the various Spanish and Portuguese officials on the coast, and especially to Consul Hutchinson at Fernando Po, and to the Missionaries at Victoria (Ambas Bay), the Revs. Messrs. Saker and Smith, but for whose cordial aid the Cameroons Mountains could not have been successfully explored by any European at the time of his visit. At Corisco he was much indebted to Mr. Mackey of the American Mission, who rendered him active and essential service.

The number of plants collected during these and Mr. Mann's other expeditions on the coast, amounts to probably 3000 flowering species, of which 237, found at elevations above 5000 ft., are those with which I propose to deal in the present paper. Nearly half of this number (viz. 112) are new species, and upwards of half are from the Cameroons Peaks.

Excluding the few peculiar to St. Thomas's and Prince's Islands, we have on the Cameroons Mountains, at elevations above 5000 ft., 203 species, and on Fernando Po Peak 102, of which 68 are common to both localities. The Monocotyledons bear a larger proportion to the Dicotyledons on the Cameroons (1 : 2·3) than on Fernando Po Peak (1 : 3·2). The proportion of nondescript to the previously known species was nearly the same on the Cameroons (1 : 2·2) as on Fernando Po (1 : 2·3); but of the plants common to both localities the proportion of novelty is much smaller (1 : 2·8).

I have adopted the above-mentioned altitude of 5000 ft. as the lower limit of the Temperate Flora, because both on Fernando Po and the Cameroons Mountains the temperate forms preponderate largely at that elevation. In these mountains, however, as in all other tropical ones, on the one hand tropical genera and species ascend to this and to much greater elevations, and on the other some temperate forms descend considerably lower, than their respective temperatures would lead us to expect. This is partly owing to the very varied conditions of exposure, humidity, and temperature which may be found at the same elevation in a mountain-region traversed by gorges and ridges, and still more to the equable annual temperature favouring both the ascent of the tropical forms and the descent of the temperate. Thus we have—

1. Plants of purely tropical forms, ascending up to and above 5000 ft., but whose normal limit is below it. The most remarkable cases are—

		feet.			feet.
Stephania	to	7,000	Gynura	to	8,500
Drynaria	„	7,000	Cephalostigma	„	7,000
Clausena	„	7,500	Anthocleista	„	7,000
Brucea	„	7,500	Alectra	„	7,000
Gomphia	„	5,000	Sopubia	„	7,000
Schmidelia	„	7,500	Coleus	„	7,000
Desmodium	„	7,000	Leucas	„	8,000
Shuteria	„	7,000	Achyranthes	„	7,000
Dalbergia	„	5,000	Cyathula	„	10,000
Kalanchoë	„	7,000	Phyllanthus	„	7,000
Mukia	„	7,000	Urera	„	5,000
Loranthus	„	8,000	Peperomia	„	8,000
Ixora	„	5,000	Bolbophyllum	„	6,000
Mikania	„	7,000	Angræcum	„	6,000
Microglossa	„	7,000	Polystachya	„	6,000
Dichrocephala	„	10,700	Calanthe	„	5,000
Blumea	„	8,000	Commelyna	„	7,000

I have excluded here the annuals, which so often owe their upward extension to local circumstances that do not annually recur; as also all the Panicoid and Andropogonoid grasses. Also many genera which have almost equal claim to rank as temperate and as tropical, as *Pittosporum*, *Impatiens*, *Ilex*, *Vernonia*, *Celsia*, &c. &c.

From a tabulation of these, I find that there are, at elevations above 5000 ft.,—

	Genera.	Species.
Truly temperate forms	80	112
Temperate and tropical, or intermediate	36	60
Truly tropical	46	65

2. The temperate forms that descend below 5000 ft. are comparatively few. The principal are:—

		feet.			feet.
Clematis	to	4000	Adenostemma	to	2000
Hypericum	„	4000	Senecio	„	2500
Rubus	„	4000	Leucothoë	„	4000
Sanicula	„	4000	Ericinella	„	4000
Anthriscus	„	4000			

3. The following species are common to the Himalaya and mountains of Biafra :—

	feet.
Cardamine hirsuta	7–10,000
—— Africana	7,500
Cerastium vulgatum....	8,000
Drynaria cordata	7,000
Oxalis corniculata......	7–8,500
Tillæa pentandra	8,000
Sanicula Europæa......	4–7,500
Galium Aparine	7–10,000
—— rotundifolium	7–12,000
Scabiosa succisa	10,500
Adenostemma viscosum	2–1,000
Mikania chenopodiifolia	4–7,000
Dichrocephala latifolia ..	7,000
—— chrysanthemifolia	7,000
Blumea alata	7–8,000
Cephalostigma Perrotetii	7,000
Mæsa Indica	5–7,000
Cynoglossum micranthum	7–8,000
Myosotis stricta........	8–10,000
Limosella aquatica	9–10,000
Sibthorpia Europæa	7–7,500
Solanum nigrum	7–11,000
—— Indicum	6–7,000
Utricularia orbiculata ..	5,000
Rumex obtusifolius	7,000
Polygonum Nepalense ..	7,500
Achyranthes argentea ..	7,000
Parietaria Mauritanica ..	7–8,000
Loranthus Wightii	7,500
Luzula campestris	8–10,000
Isolepis capillaris	8–10,500
Microchloa setacea	7,000
Deschampsia cæspitosa	9–12,000
Aira caryophyllea	7–8,000
Poa nemoralis	7–10,000
Kœleria cristata........	8–12,000
Vulpia bromoides	7–10,000
Brachypodium sylvaticum	7,000
Andropogon distachyus..	7,000

In this list twenty-two out of the thirty-nine are European and for the most part British.

4. Genera and species found at elevations above 9000 feet :—

Thalictrum rhynchocarpum.
Cardamine hirsuta.
Silene Biafræ, n. sp.
Arenaria Africana, n. sp.
Sagina Abyssinica.
Hypericum angustifolium.
Adenocarpus Mannii, n. sp.
Trifolium subrotundum.
Rubus apetalus.
Umbilicus pendulinus.
Crassula Mannii, n. sp.
Pimpinella oreophila, n. sp.
Peucedanum Petitianum.
Vignaldia occidentalis, n. sp.
Anthospermum asperuloides, n sp.
Galium Aparine.
—— rotundifolium.
Scabiosa succisa.
Dichrocephala oblonga.
Helichrysum Mannii, n. sp.
—— fœtidum.
—— chrysocoma.
—— globosum.
Senecio Barterii.
—— Clarenceana, n. sp.
Anisorhamphus hypochæroides?
Wahlenbergia arguta.
Lobelia acutidens, n. sp.
Leucothoë angustifolia β.
Blæria spicata.
Ericinella Mannii, n. sp.
Sebæa brachyphylla.
Swertia pumila.
—— Clarenceana, n. sp.
Myosotis stricta.

Limosella aquatica.
Veronica Mannii, n. sp.
Bartsia Abyssinica.
Micromeria punctata.
Calamintha Simensis.
Stachys aculeolata, n. sp.
Solanum nigrum.
Cyathula cylindrica.
Thesium tenuissimum, n. sp.
Habenaria præalta.
Trichonema Bulbocodium.
Geissorhiza alpina, n. sp.
Melanthium tenue, n. sp.
Cyanotis Abyssinica.
Luzula campestris.
Isolepis capillaris.
—— schœnoides.
Carex Æthiopica.
Vilfa montana, n. sp.
Deyeuxia Mannii, n. sp.
Deschampsia cæspitosa.
Aira caryophyllea.
—— pictigluma.
Avena lachnantha.
Poa nemoralis.
Kœleria cristata.
Vulpia bromoides.
Festuca Schimperiana.
Andropogon Mannii.

Total genera	56	British	38
		Other European	5
		Peculiar to Cape	1
		—— to Abyssinia	1
		Chiefly tropical	4

5. The European species found on the mountains of Biafra are the following. I have appended to each any real or apparent facility for aërial or casual transport which it possesses.

Ranunculus pinnatus, 8000 ft. (Achenes with hooked styles.)
Cardamine hirsuta, 7000–10,000 ft. (Seeds very minute.)
Cerastium vulgatum, 8000 ft.? (Ditto.)
Radiola Millegrana, 7000 ft. (Ditto.)
Oxalis corniculata, 7000–8500 ft. (Ditto.)
Umbilicus pendulinus, 7000–10,000 ft. (Ditto.)
Sanicula Europæa, 4000–7500 ft. (Carpels with hooked bristles.)
Galium rotundifolium, 7000–12,000 ft. (Leaves and stems with hooked bristles.)
—— Aparine, 7000–10,000 ft. (Ditto ditto and fruit.)
Scabiosa succisa, 10,500 ft.
Myosotis stricta, 8000–10,000 ft. (Hooked hairs on calyx.)
Limosella aquatica, 9000–10,000 ft. (Aquatic.)
Sibthorpia Europæa, 7000–7500 ft. (Minute seeds.)
Solanum nigrum, 7000–11,000 ft. (Seeds with great powers of vitality.)
Rumex obtusifolius, 7000 ft. (Hooks on fruiting perianth.)
Parietaria Mauritanica, 7000–8000 ft. (Minute seeds.)
Trichonema Bulbocodium, 7000–9000 ft. (Ditto.)
Juncus capitatus, 7000 ft. (Ditto.)
Luzula campestris, 8000–10,000 ft. (Ditto.)
Deschampsia cæspitosa, 9000–12,000 ft. (Ditto.)
Aira caryophyllea, 7000–8000 ft. (Ditto.)

Poa nemoralis, 7000–10,000 ft.	(Minute seeds.)
Kœleria cristata, 8000–12,000 ft.	(Ditto.)
Vulpia bromoides, 7000–10,000 ft.	(Ditto.)
Festuca gigantea, 8500 ft.	(Ditto.)
Brachypodium sylvaticum, 7000 ft.	(Ditto.)
Andropogon distachyus, 7000 ft.	(Ditto.)

Of these 27, all but the *Radiola*, *Juncus*, and *Festuca* are Abyssinian, and these latter are for the most part West-European forms.

The most remarkable features of the Temperate vegetation of these mountains are—

1. The poverty of the flora.
2. The preponderance of Abyssinian genera and species.
3. The considerable proportion of European plants.
4. The paucity of South-African genera and species.
5. The great rarity of new genera.
6. The absence of St. Helena types.

Upon each of these propositions I have a few general remarks to offer.

1. In the poverty of its flora the Cameroons range, &c. seems to partake of the characteristics of the Abyssinian Alps. We know far too little of the physical geography of either of these districts to hazard many conjectures upon this point, which must to a certain extent be dependent on the arid volcanic nature of the soil and the limited area of the temperate region. Mr. Mann spent many weeks, and at various seasons, in his explorations, and yet 237 flowering plants were all that rewarded his toil. Geological causes have probably had, in the case of the Cameroons Mountains, much to do with the dearth of species, some parts of the range even now presenting evidence of subterranean heat.

2. The preponderance of Abyssinian forms is proved by almost all of the genera and half the species being natives of Abyssinia, and by many other species being very closely related to, or obvious representatives of, plants of that country. There are, further, several of the genera and many of the species peculiar to Abyssinia and the peaks of Biafra.

3. The number of European genera amounts to 43, and species to 27, by far the greater part of which are British; and a few of them, as *Radiola Millegrana*, have not been found previously anywhere in the African continent*. Very few of them extend into South Africa. The greater part are Abyssinian; the remarkable exceptions being *Radiola*, *Scabiosa succisa*, *Luzula campestris*, and

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* Since this Paper was read, I have been informed by Mr. Munby that he has found *Radiola Millegrana* in one spot in Algeria.

Festuca gigantea, all of which, however, may have been hitherto overlooked in Abyssinia.

Considering the total isolation of these tropical African mountains from the European regions by hot, low deserts, the existence of these plants in common is most singular, and explicable under two hypotheses: 1st, Mr. Darwin's theory, which assumes that during the glacial epoch the plants of the northern zones were driven southwards into the tropics, and on the return of warmth they both retreated northwards and ascended the intertropical mountains; and 2nd, transport by aërial currents and birds—in favour of which is to be urged that, of the whole, six present structural adaptations for clinging to the plumage of birds, and all the rest have small or very minute seeds, likely to be transported in mud on the feet of birds. *Solanum nigrum* has rather larger seeds, but with remarkable power of retaining their vitality, and, further, is found in North Africa and many intermediate countries, as are several of the others.

4. The paucity of South-African types was alluded to in discussing the 76 species of the Fernando Po mountain. The great accession of species from the Cameroons has added but few Cape forms; the principal are, *Anthospermum*, *Anisorhamphus* (perhaps referable to *Hieracium*), a species of *Ilex*, *Lasiosiphon*, *Peddiea*, *Geissorhiza*, *Hypoxis*, and a few others.

5. Only one new genus has been found, *Ardisiandra* (see Plate I.)—a very well marked new form of Primulaceæ, not indicating an affinity with any other flora.

6. Of the peculiar genera and species of St. Helena not one has been found; and what genera are common to that island and these mountains are also natives of the Cape region, and far more abundant there.

Florula of the Peaks of Biafra at and above 5000 feet elevation.

1. RANUNCULACEÆ.

1. **CLEMATIS SIMENSIS**, *Fresen.* (*ante*, vi. 4).
Hab. Fernando Po and Cameroons Mountains, alt. 4000–8000 feet. (Fl. and frt. Dec.–Jan.)

Fruiting specimens are identical with Abyssinian. The Cameroons Mountains' individuals have the flowers as large as the Abyssinian.

2. **THALICTRUM RHYNCHOCARPUM**, *A. Rich* (*ante*, vi. 4).
Hab. Fernando Po, alt. 10,000 feet. Cameroons Mountains, alt. 7000 feet. (Fl. and frt. Nov.)

3. **Ranunculus pinnatus**, *Poir.*, var. *extensa.* Carpellis lævibus (*ante*, vi. 5).
Hab. Fernando Po, alt. 8000 feet. (Fl. Dec.)

2. Menispermaceæ.

1. **Stephania hernandifolia**, *Wall.* (*ante*, vi. 5).
Hab. Fernando Po, alt. 3000–5000 feet. Cameroons Mountains, alt. 7000 feet. (Fl. and frt. Dec.)

3. Cruciferæ.

1. **Cardamine hirsuta**, *L.*, var. *Simensis.* C. Simensis, *Hochst.*
Hab. Fernando Po, alt. 7500–8500 feet. Cameroons Mountains, alt. 8000–10,000 feet. (Fl. Nov.)

2. **Cardamine Africana**, *Thunb.*, var. *pubescens.*
Hab. Fernando Po, alt. 7500 feet.

4. Violarieæ.

1. **Viola Abyssinica**, *Steud.*, var. *impunctata* (*ante*, vi. 5).
Hab. Fernando Po, alt. 10,000 feet. Cameroons Mountains, alt. 7000 feet. (Fl. Jan.)

5. Pittosporeæ.

1. **Pittosporum Mannii**, *H.f.* (*ante*, vi. 5).
Hab. Fernando Po, alt. 8500 feet. Cameroons Mountains, alt. 4000–7500 feet. (Fl. Dec.; frt. Jan.)

The Cameroons specimens contain excellent fruit, from which I learn that the small capsules alluded to in the Fernando Po plant were imperfectly developed; those now sent are very similar to *P. Senacia* of Mauritius, from which, however, as before observed, the species differs widely in the inflorescence and small flowers.

6. Polygaleæ.

1. **Polygala tenuicaulis**, *H.f.*, n. sp. Annua, patentim pilosa, caule gracili simpliciusculo elongato, foliis anguste lineari-lanceolatis, racemis multifloris secundis, bracteis bracteolisque minutis, floribus breviter pedicellatis, sepalis pilosis exterioribus late oblongis alis late obovatis triente brevioribus, carinæ crista brevi bilamellata, capsula obcordata emarginata pilosa.
Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Nov. and Dec.)
Herba spithamæa ad pedalem, ubique pilis patentibus tomentella v. hispidula, caule gracili teretiusculo debili superne sæpius diviso. *Folia* $\frac{1}{2}$–1″ longa, marginibus siccitate recurvis. *Racemi* 2–3″ long. *Flores* rubicundi (siccitate flavo-virescentes), nutantes, $\frac{1}{5}$″ longi. *Alæ* venosæ. *Carinæ* crista inclusa. *Capsula* membranacea, inclusa.

7. CARYOPHYLLEÆ.

1. SILENE BIAFRÆ, *H.f.*, n. sp. Erecta, pubescenti-tomentosa, foliis anguste linearibus, floribus suberectis, calyce anguste oblongo-campanulato atro-pubescente, lobis anguste oblongis subacutis, costis crassis atris, petalis calyce paulo longioribus pubescentibus, lamina parva ad medium 2-loba carnosa basi appendicibus 2 carnosis coronata, thecaphoro capsula triente breviore.

Hab. Cameroons Mountains, alt. 8000–10,000 feet. (Fl. Nov.)

Herba 1–3-pedalis, parce ramosa, ramis teretibus. *Folia* pollicaria et ultra, anguste linearia. *Racemi* 4–8-flori. *Flores* nutantes v. erecti, breviter pedicellati, ½ unc. longi.

Very nearly allied to the North-African and Abyssinian *S. bipartita*, Desf. (to which the Cape *S. Burchellii* is too nearly allied), but differing in its great size, the less contracted base of the calyx, small fleshy lamina of the petals, and the corona reduced to two prominent fleshy lobes. It is probable that these are all states of one species, of which the present, from the most tropical and humid locality, has much more highly developed vegetative organs and correspondingly reduced reproductive ones. I cannot determine whether it is annual or perennial.

2. CERASTIUM VULGATUM, *L.*, var. *glomeratum*, Thuil. C. viscosum, *Fries.*

Hab. Cameroons Mountains (no elevation given).

The leaves are more uniformly acute than in the common European states. It is also an Abyssinian plant, *C. Simense*, Hochst., in no way differing from the European form.

3. STELLARIA MANNII, *H.f.*, n. sp. Caule procumbente diffuse ramoso tenui glaberrimo, apicibus ramorum et inflorescentia glanduloso-pilosis, foliis petiolatis ovatis acutissimis, floribus laxe paniculatis, sepalis ovato-lanceolatis acuminatis, petalis sepala subæquantibus ad medium 2-fidis, stylis 3, capsula 4-valvi 1-sperma.

Hab. Cameroons Mountains, alt. 7000 feet.

Caules 1–2-pedales, flaccidi, ramis adscendentibus. *Folia* longe petiolata, ⅔–1 unc. longa, læte viridia, tenuiter membranacea, margine subcrispato, petiolo ¼–¾ unc. longo. *Flores* ad apices ramorum laxe paniculati, graciliter pedicellati, ⅓ unc. lati, bracteis lanceolatis acuminatis. *Sepala* viridia, herbacea, carinata. *Petala* tenerrima, lobis falcatis apicibus conniventibus. *Ovarium* parvulum, 5–6-ovulatum. *Capsula* parvula, glaberrima. *Semen* (morbidum ?) magnum, testa papilloso-granulosa.

Very closely allied to the Cingalese *S. drymarioides*, Thw., and Himalayan *S. monosperma*, Ham., but differing from both in the foliage and larger flowers.

4. Arenaria Africana, *H.f.*, n. sp. Tota (superne præcipue) glanduloso-pilosula v. pubescens, caulibus gracilibus prostratis, foliis distantibus sessilibus lanceolatis acutissimis membranaceis, floribus ad apices ramorum paucis laxe paniculatis, sepalis oblongis subacutis anguste marginatis, petalis angustis retusis v. breviter 2-lobis, stylis 5, capsula oblonga 5-valvi, seminibus aurantiacis granulatis.

Hab. Cameroons Mountains, alt. 7000–10,000 feet. (Fl. Dec.)

Caules ¼–1-pedales, laxe ramosi, debiles, fragiles, internodiis 1–2 unc. longis. *Folia* patentia, plana, pollicaria, basi obtusa, utrinque glanduloso-pilosa. *Panicula* pauciflora, pedicellis ¼–½ unc. longis. *Flores* ⅓ unc. diam. *Sepala* viridia, planiuscula. *Petala* sepalis longiora, alba, tenuiter membranacea, sensim apicem versus latiora, apice rotundato retuso v. 2-fido. *Stamina* 10, filamentis tenuissimis. *Ovarium* lineari-oblongum. *Capsula* sepalis paulo longiora. *Semina* ad 10–12, compressa, opaca, cotyledonibus incumbentibus.

A flaccid slender species, much resembling some very weak shoots of the North-African *A. procumbens*; but the flowers are white, the leaves are very different, the cotyledons accumbent, and, as far as I can make out, the capsule is only 5-valved. I know of no very nearly allied species. The petals are sometimes as much bifid as in many Stellarias; they vary much, sometimes even in the same flower.

5. Sagina Abyssinica, *Hochst.* (*ante,* vi. 6).

Hab. Fernando Po, alt. 8500 feet. Cameroons Mountains, alt. 9000–11,000 feet. (Fl. Nov.–Jan.)

Plant sometimes forming dense hard tufts with woody roots.

6. Drynaria cordata, *Willd.*

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec., Jan.)

8. Hypericineæ.

1. Hypericum angustifolium, *Lamk.* (*ante,* vi. 6).

Hab. Fernando Po, alt. 7000–10,000 feet. Cameroons Mountains, alt. 4000–8000 feet. (Fl. Dec.)

The leaves of Cameroons specimens are as narrow as of Abyssinian, and as well as the calyx are copiously glandular, but have few black dots.

9. Lineæ.

1. Radiola Millegrana, *L.*

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.)

Absolutely identical in every particular with the European plant, which ranges from Scandinavia to Spain and from Madeira to Southern Russia, but has not hitherto been found in North Africa*.

10. GERANIACEÆ.

1. **GERANIUM EMIRNENSE,** *Hils. & Boj. MSS. in Hb. Hook.*
Hab. Fernando Po, alt. 8500 feet.

2. **GERANIUM SIMENSE,** *Hochst.* (*ante*, vi. 6).
Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Nov.–Jan.)

The same as Hochstetter's plant, except in the sepals being rather more gradually acuminated and the stipules rather narrower. It differs from the Fernando Po and Madagascar *G. Emirnense*, Hils. & Boj., with which it is confounded in the Fernando Po florula, in wanting the spreading hairs. In Abyssinia it inhabits the middle region of Mount Silke.

3. **GERANIUM FAVOSUM,** *Hochst.*
Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.)—Herbacea, 4-pedalis.

Except in the rather smaller size of all its parts, and the lobing of the leaf hardly being carried below the middle, this is identical with the very remarkable Abyssinian species of Hochstetter. It is readily distinguished by the slender habit, copious spreading glandular hairs in all its parts, membranous foliage with acutely laciniate lobes, very short peduncles—often so short that the pedicels appear in pairs in the axils of the leaves, and the rugose carpels. In Abyssinia it is found at 5500 feet elevation, in the province of Agow.

4. **OXALIS CORNICULATA,** *L.* (*ante*, vi. 8).
Hab. Fernando Po, alt. 8500 feet. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.)

IMPATIENS.

I have here described all the species of this beautiful genus which have been discovered by Mr. Mann in the Islands of Biafra, Cameroons Mountains, and Sierra del Crystal.

1. **VERTICILLATÆ.** *Folia* verticillata v. opposita. *Flores* subumbellati v. in racemos longe pedunculatos breviter pedicellati.

1. **IMPATIENS SAKERIANA,** *H.f.*, n. sp. Caule erecto, foliis verticillatis

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* See footnote at p. 181.

graciliter petiolatis oblongo-lanceolatis acuminatis cuspidato-serratis, pedunculis folio longioribus, floribus breviter racemosis, sepalis late ovatis, vexillo galeato, labello infundibuliformi in calcar robustum apice inflatum contracto, alis parvis.

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Nov.–Jan.)

Species pulcherrima, elata, 8-pedalis, ramosa?, inferne glabra, apicibus ramorum petiolis pedunculis basi foliisque junioribus subvillosis. *Folia* 1–4 unc. longa, in verticillo 3–6, petiolis ½–3 unc. long., patentia, membranacea, glaberrima v. pilosula, crenato-serrata, crenis apice v. prope apicem setosis. *Pedunculi* validi, valde elongati, rigidi, 4–10-flori. *Bracteæ* ovatæ, acuminatæ, herbaceæ, persistentes. *Pedicelli* ½–1 unc. longi. *Flores* coccinei? *Sepala* bracteis similia, viridia, herbacea. *Vexillum* tumidum, valde concavum, obtusum, dorso apiculatum, lateribus productis. *Labellum* cum calcari ¾ unc. long., calcari in apicem pyriformem 2-lobum tumente. *Alæ* lineares, vexillo vix longiores, porrectæ, flavo et purpureo ut videtur coloratæ. *Capsula* ⅔ unc. longa, ovalis, medio turgida, utrinque attenuata.

Named in compliment to the Rev. Mr. Saker, Mr. Mann's companion in his ascent of the Cameroons Mountains, and to whom he is much indebted for the success of his enterprising journey.

2. UMBELLATÆ. *Folia* alterna. *Flores* ad apicem pedunculi elongati, subumbellati.

2. IMPATIENS FILICORNU, *H. f.* (*ante*, vi. 6).

Hab. Fernando Po, alt. 4000–5000 feet. Sierra del Crystal. (Fl. Dec.)

3. IMPATIENS MACROPTERA, *H. f.*, n. sp. Glaberrima, caule crasso erecto nodoso, foliis apicem versus caulis alternis petiolatis ovatis acuminatis grosse crenatis inter crenas setiferis, pedunculis axillaribus elongatis erectis 2–4-floris, bracteis sepalisque ovatis acutis, pedicellis breviusculis, floribus magnis, vexillo parvo orbiculato purpureo, labello late oblique conico, calcari brevi incurvo, alis maximis pendulis oblongis obtusis.

Hab. Fernando Po, alt. 4500 feet. (Fl. April.)

Herba 2–4-pedalis. *Caulis* nodosus. *Folia* (cum petiolo glaberrimo) 3–4″ longa, superne sub lente fasciculis subcutaneis raphidum notata. *Pedunculi* folia superantes. *Bracteæ* et *sepala* consimilia, ⅕″ longa. *Pedicelli* 1″ longi. *Flores* 2–2½″ longi, albi et virescentes (*ex Mannio*). *Vexillum* ut videtur ex sicco violaceum.

4. IMPATIENS PALPEBRATA, *H. f.*, n. sp. Parvula, pilosula, caule simplici paucifoliato, foliis graciliter petiolatis anguste oblongo-ovatis cordatis grosse crenatis crenis infimis longissime ciliolatis, scapo longissimo tenui apice florifero, bracteis minutis, pedunculis breviusculis, sepalis majusculis, vexillo breviusculo, alis elongatis stipitatis,

labello brevi in calcar crassum basi abrupte incurvum acutum repente contracto.

Hab. Sierra del Crystal. (Fl. July.)

Spithamæa. *Folia* $\frac{3}{4}$–1 unc. longa, membranacea, profunde crenato-lobulata, ciliis basi rigidis fere $\frac{1}{4}$ unc. longis; petiolo laminæ subæquilongo. *Scapus* 3 unc. longus, gracilis, apice 3–5-florus, pedicellis $\frac{1}{4}$ unc. longis. *Flores* $\frac{1}{2}$ unc. diam. *Vexillum* $\frac{1}{6}$ unc. latum, sepalis æquilongum. *Alæ* divaricatæ, $\frac{1}{3}$ unc. longæ, dimidiato-oblongæ, purpureæ. *Labellum* $\frac{1}{4}$ unc. longum, ore oblongo, acuto, purpureo et viridi striato.

3. UNIFLORÆ. *Folia* alterna. *Pedunculi* axillares, sæpissime solitarii v. bini, uniflores.

5. IMPATIENS MANNII, *H. f.* (*ante*, vi. 7).

Hab. Fernando Po, alt. 4000 feet. Cameroons Mountains, alt. 2500–3000 feet. (Fl. April–Dec.)

In exemplaribus e mont. Cameroons, nervi foliorum subtus pedunculique pubescentes evadunt, et vexillum latius.

6. IMPATIENS BICOLOR, *H. f.* (*ante*, vi. 7), *Hook. Bot. Mag.* t. 5366.

Hab. Fernando Po, alt. 4000 feet. Cameroons Mountains, alt. 3500 feet. (Fl. Dec.–Feb.)

7. IMPATIENS BURTONI, *H. f.*, n. sp. Caule gracili erecto superne foliisque junioribus pilis mollibus subvilloso, foliis alternis graciliter petiolatis ovato- v. oblongo-lanceolatis acuminatis crenatis membranaceis utrinque sparse pilosulis, pedunculis solitariis axillaribus 1-floris gracilibus, sepalis lineari-lanceolatis acuminatis, vexillo bilobo dorso carinato piloso cornuto, labello late infundibuliformi, calcari tenui lente curvo, alis amplis.

Hab. Cameroons Mountains, alt. 2500–3000 feet. (Fl. Dec., Jan.)

Herba 2–3-pedalis. *Caulis* inferne glaber, siccitate sulcatus. *Folia* 3–4 unc. long., in petiolum attenuata, sinibus crenarum setulosis. *Pedunculi* petiolis longiores, erecti v. patentes. *Flores* flavi?, 1 unc. longi. *Vexillum* alis dimidio minus, late quadratum. *Calcar* vexillo vix longius, lente curvum. *Alæ* rhombeo-triangulares, patentes, angulis rotundatis. *Capsula* late elliptica, glaberrima.

4. LATERIFLORÆ. *Folia* alterna. *Pedunculi* axillares, solitarii, sæpissime 2–4-flores.

8. IMPATIENS HIANS, *H. f.* (*ante*, vi. 7).

Hab. Fernando Po, alt. 2000 feet.

9. IMPATIENS BUCCINALIS, *H. f.*, n. sp. Glaberrima, caule ramoso, ramis geniculatim flexuosis apices versus foliatis, foliis petiolatis oblongo-lanceolatis acuminatis crenatis inter crenas setiferis, petiolis setis crassis glanduliferis sparsis, racemis brevibus 2–4-floris, bracteis late ovatis mucronatis, pedunculo brevi, pedicellis gracilibus flore

brevioribus, sepalis late ovatis cuspidatis, vexillo cucullato dorso late alato, labello crasso elongato cylindrico in calcar crassum circinatum intus gibbum contracto, alis parvis inclusis.

Hab. St. Thomas's Island, alt. 4000 feet.

Herba frutescens 12–15-pedalis (*G. Mann*), ramis ad axillas foliorum glandula depressa orbiculari auctis. *Folia* 4–6" long., membranacea, nervis arcuatis, petiolo setis crassis glanduligeris sparsis. *Flores* 2" longi, $1\frac{1}{2}$" diametr. (ut videtur ex sicco rubri). *Vexillum* profunde concavum et dorso late alatum. *Labellum* ore acuminato, crassum, curvum, ad apicem in calcar circinatum abrupte attenuatum, latere incurvo ad basin calcaris abrupte gibbo inflato; calcari crassi, brevi, apice obtuso. *Alæ* parvæ, 2-lobæ, obtusæ, vexillo æquilongæ, os labelli non excedentes.

10. IMPATIENS MACKEYANA, *H. f.*, n. sp. Elata, robusta, glaberrima; caule crasso, foliis ad apicem caulis confertis alternis petiolatis elongato-lanceolatis setoso-serratis, pedunculis axillaribus brevibus 2–3-floris, floribus maximis, vexillo amplo latissime ovato, alis stipitatis amplissimis, labello brevi late conico v. scaphæformi in calcar tenue inflexum repente contracto.

Hab. Sierra del Crystal, on rocks. (Fl. July.)

Species omnium fere speciosissima. *Caulis* 1–2-pedalis, succulentus. *Folia* 4–10 unc. longa, petiolis 1–3 unc. longis, sparse glandulosis v. setosis. *Pedunculi* cum pedicellis 1–3 unc. longi; bracteis minutis. *Flores* læte purpurei, 2–3 unc. diametr. *Sepala* $\frac{1}{4}$–$\frac{1}{3}$ unc. longa, oblique oblonga, acuminata. *Vexillum* 1 unc. latum, obtusum, membranaceum, multo latius quam longum. *Alæ* 2 unc. longæ, patentes, 2-lobæ, lobo inferiore laterali subrotundato quam terminalis obovatus multo minore. *Labellum* breve, ore oblongo 1 unc. diametr. longiore; calcari $\frac{1}{3}$ unc. longo. *Capsula* $\frac{1}{3}$ unc. longa, oblique oblonga, utrinque attenuata. *Semina* perplurima, minuta, obovoidea, rufa, papillosa.

11. RUTACEÆ.

Trib. AURANTIACEÆ.

1. CLAUSENA INÆQUALIS, *Benth. in Fl. Nigrit.* 257.

Hab. Cameroons Mountains, alt. 7000–7500 feet. (Fl. Dec.–Feb.) (Tree 10 feet).

Professor Oliver, who has kindly examined these specimens, finds no difference, beyond the more luxuriant habit, between them and others from South Africa, where it abounds from Uitenhage to Macalisburg. He further identifies it with *C. anisata* of Cape Coast, and considers it scarcely distinguishable from *C. Willdenovii* of India, except by the collateral insertion of the ovules.

12. SIMARUBEÆ.

1. BRUCEA ANTIDYSENTERICA, *Miller*.

Hab. Cameroons Mountains, alt. 7000–7500 feet. (Fl. Dec.–Feb.)

Mann's plant seems identical with the Abyssinian. It grows 20 feet high.

13. OCHNACEÆ.

1. GOMPHIA MICRANTHA, *H. f.* (*ante*, vi. 8).

Hab. Fernando Po, alt. 5000 feet. (Fl. Nov.)

14. ILICINEÆ.

1. ILEX CAPENSIS, *Sond. & Harv. Fl. Cap.* i. 473.

Hab. Cameroons Mountains, alt. 4000–7500 feet. (Fl. Feb.)

Apparently a very common South-African plant, found from the vicinity of Cape Town to Macalisburg. It attains 40 feet high on the Cameroons.

15. AMPELIDEÆ.

1. VITIS (CISSUS) CYPHOPETALA, *Fres.*; *A. Rich. Fl. Abyss.* i. 110.
Var. *occidentalis*, foliolis glabratis acutius serratis.

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Nov.)

Very near indeed to the Abyssinian plant, but differing in the rather narrower, more acuminate leaflets with sharper serratures, and in being everywhere less pubescent; the structure of the remarkable flowers is identical. The leaves show a tendency to become digitate.

16. SAPINDACEÆ.

1. SCHMIDELIA ABYSSINICA, *Hochst. in Pl. Schimp.* S. Africana, *DC. ex A. Rich., Flor. Abyss.* i. 102, sed vix.

Hab. Cameroons Mountains, alt. 7000–7500 feet. (Fl. Dec.)

The ripe carpels of the Cameroons specimens are rather larger than those of the Abyssinian (*S. Abyssinica*, Hochst.), and more distinctly pedicellate. Our specimens are from a tree 30–40 feet high. Schimper describes it as "arbor altissima," and says it grows in the mountain-region of Semajata. A. Richard unites the Abyssinian plant with the Oware one of Palisot; but they differ so much in the size of the flowers, that they seem scarcely the same specifically.

17. LEGUMINOSÆ.

1. ADENOCARPUS MANNII, *H. f.* Cytisus Mannii (*ante*, vi. 8).

Hab. Fernando Po, alt. 9000 feet. Cameroons Mountains, alt. 7000–12,000 feet. (Fl. Dec.)

The flowers of the Cameroons Mountains' specimens are con-

siderably larger than the Fernando Po ones, and the pods prove it to be a true *Adenocarpus*.

2. TRIFOLIUM SUBROTUNDUM, *Steud. & Hochst.*; *var.* stipulis majoribus (*ante*, vi. 8).
Hab. Fernando Po, alt. 9000 feet. (Fl. Dec.)

3. TRIFOLIUM SIMENSE, *Fresen.* (*ante*, vi. 9).
Hab. Fernando Po, alt. 8500 feet. Cameroons Mountains, alt. 7000 feet. (Fl. Nov., Dec.)

4. INDIGOFERA ATRICEPS, *Hook.*, n. sp. Fruticulus gracilis, hispido-setulosus, foliis imparipinnatis, foliolis 9–13 obovatis v. obovato-oblongis apiculatis utrinque petiolisque hispidulis, pedunculis axillaribus foliis longioribus racemisque brevibus atro-pilosulis, calycis tubo brevi turbinato lobis longe subulatis, ovario 5–8-spermo, legumine hispido-piloso stylo filiformi persistente terminato.
Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Nov.–Jan.)
Fruticulus ramosus, 2–3-pedalis, ramis teretiusculis, partibus novellis setis patentibus deciduis glandulosis sparsis, ramulis ultimis pedunculis calycibusque atris. *Folia* $\frac{3}{4}$–$1\frac{1}{2}$ unc. longa, petiolo gracili; foliola petiolulata, plana, enervia, $\frac{1}{3}$–$\frac{1}{2}''$ longa; stipulæ filiformes. *Flores* $\frac{1}{4}$ unc. longi, purpurei, breviter pedicellati, conferti, subsecundi; bracteolæ subulatæ. *Calycis* lobi stamina æquantes. *Vexillum* late oblongum, apice rotundatum, reflexum, dorso hispido-pilosum. *Alæ* spathulatæ, obtusæ, carinam æquantes, apices versus extus hispidulæ. *Antheræ* longe mucronatæ. *Legumen* teretiusculum, $\frac{1}{3}$ unc. long., setulis atris bifurcatis hispidulum, pilisque pallidis glanduliferis patentibus sparsis deciduis onustum. *Ovarium* pilosum, septis spuriis locellatum, 6–8-spermum. *Semina* parva, immatura.

5. DESMODIUM STRANGULATUM, *Wight & Arn.*
Hab. Cameroons Mountains, alt. 2000–7000 feet. (Fl. Jan.)

A variety with obtuse leaves (so far as I can judge without ripe fruit) of the common tropical Indian and African weed, which varies with leaflets acuminate and obtuse.

6. SHUTERIA AFRICANA, *H.f.*, n. sp. Molliter retrorsum sericeo-pilosa, stipulis bracteisque lineari-oblongis scariosis multistriatis, foliolis late ovato-oblongis ovatisve longe apiculatis membranaceis superne pilosis subtus sericeo-pilosis, racemis elongatis, floribus graciliter pedicellatis, calycis tubo cylindraceo-campanulato lobis subulatis duplo longiore, leguminibus lineari-ensiformibus undulatis compressissimis marginatis.
Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Nov.)
Caulis gracilis, volubilis, 10–12-pedalis. *Petioli* graciles, 2 unc. longi. *Foliola* 2 unc. longa, lateralia basi stipellis filiformibus aucta. *Stipulæ*

⅓ unc. longæ. *Racemi* 3–4 unc. longi, multiflori; bracteæ ¼–⅓ unc., pedicellis longiores. *Flores* ½ unc. long. *Calyx* ebracteolatus, parce pilosus. *Corolla* purpurea. *Vexillum* obovatum, anguste biauriculatum. *Stamen* vexillare, liberum. *Stigma* capitatum. *Legumen* subsericeum, ½–1 unc. longum, ⅙ unc. latum, utrinque oblique acutatum, apice rostratum, 2–4-spermun, intus continuum. *Semina* reniformia, marmorata, ⅛ unc. lata.

This is identical with an Abyssinian species collected by Dr. Roth near Ankobar.

7. DALBERGIA, sp.

Hab. Cameroons Mountains, alt. 5000 feet. (Fl. Dec.)

A tropical, glabrous, and apparently new species, of which I have no fruit. The leaflets are 3–4-jugate, petiolulate, lanceolate, with attenuate retuse apices, coriaceous. Flowers on short, branched, nearly glabrous panicles.

18. ROSACEÆ.

1. RUBUS APETALUS, *Poir.* (*ante*, vi. 9).

Hab. Fernando Po, alt. 7000 feet. Cameroons Mountains, alt. 4000–9000 feet. (Fl. Nov.)

Some of the Cameroons Mountains' specimens are apetalous, like the East African; and Mr. Mann observes that the fruit is eatable.

2. ALCHEMILLA TENUICAULIS, *H. f.*, n. sp. Parvula, laxe molliter patentim villosa, caulibus elongatis prostratis, foliis orbiculari-reniformibus 5–7-lobis, lobis obtusis crenulato-serratis, foliis floralibus cuneatis 3-lobis, calycis lobis brevibus ovatis, acheniis 2–4 glabris.

Hab. Fernando Po, alt. 7500 feet. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.)

Caules 6–12 unc. longi, tenues. *Folia* radicalia conferta, ½–¾ unc. lata, utrinque sericeo-pilosa, fere ad tertiam partem 5–7-loba. *Stipulæ* membranaceæ v. herbaceæ, profunde dentatæ. *Flores* in axillis foliorum floralium, laxe spicatæ, parvæ, sessiles. *Calycis* tubus glabriusculus, lobis parvis ovatis acutis. *Stamina* imperfecta 3 tantum visa. *Achenia* matura 2–4, stipitata, minuta, glabra.

Very similar in many respects to the *A. Capensis*, Th., but smaller in all its parts, with smaller calyx-lobes, and several much smaller achenia. The Abyssinian *A. pedata*, Hochst., has deeper-cleft leaves.

3. PYGEUM AFRICANUM, *H. f.*, n. sp. Glaberrimum, foliis longe petiolatis elliptico-oblongis obtuse acuminatis et serratis, racemis multifloris, calycis 5-lobi tubo lato intus piloso, petalis parvis fimbriatis.

Hab. Cameroons Mountains, alt. 7000–7500 feet. (Fl. Dec., Jan.)

Arbor 30–40-pedalis. *Folia* 4 unc. longa, submembranacea, læte viridia, glaberrima, eglandulosa, reticulatim venosa, petiolo gracili ½ unc. longo.

Stipulæ parvæ, deciduæ. *Racemi* pollicares et ultra, 12–20-flori, patentes. *Pedicelli* patentes v. decurvi, ¼ unc. longi, ebracteati. *Calycis* tubus hemisphærico-campanulatus, lobis brevibus latis obtusis. *Petala* parva, alba. *Stamina* 20–30, filamentis brevibus subulatis. *Antheræ* oblongæ. *Ovarium* oblique ovoideum, in stylum crassum brevem subangustatum, stigmate magno, obliquo.

Apparently identical with a species gathered in tropical Eastern Africa by Dr. Kirk (Livingstone's Expedition), at an elevation of 3000 feet, at the foot of Mount Tshiradzuri and near Mungazi, of which I have fruit only. The latter is a much depressed sphere, near ½ inch in longest diameter, coriaceous and 1-seeded. The leaves are rather more deeply toothed in Mann's plant; but that is a most variable character amongst its allies.

19. CRASSULACEÆ.

1. TILLÆA ALSINOIDES, *H.f.*, n. sp. Herba foliosa, ramosa, glaberrima, annua?; foliis breviter petiolatis ovato-oblongis subacutis integerrimis subenerviis, petiolis basi in vaginam brevem ciliatam connatis, floribus axillaribus solitariis graciliter pedicellatis, calycis laciniis planiusculis acutis petala consimilia subæquantibus, squamulis hypogynis 0, capsula polysperma.

Hab. Fernando Po, alt. 7500 feet.

Herba habitu *Alsines mediæ*. *Caules* graciles, ramosi, ad nodos radicantes. *Folia* ⅓ unc. longa, obscure 3-nervia, crassiuscula. *Pedunculi* foliis longiores v. breviores. *Flores* albi, ⅓ unc. diametr. *Capsulæ* membranaceæ, sepalis æquilongæ. *Semina* oblonga, pallida.

This species has been gathered near Ankobar in Abyssinia by Dr. Roth.

2. TILLÆA PHARNACEOIDES, *Hochst. Pl. Abyss.* i. 104. Combesia Abyssinica, *A. Rich. Fl. Abyss.* i. 307. Disporocarpa pharnaceoides, *C. A. Mey.*

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Nov.)

Also an Abyssinian and N.W. Indian plant.

3. TILLÆA PENTANDRA, *Royle.*

Hab. Cameroons Mountains, alt. 8000 feet. (Fl. Nov.)

A Himalayan and Nilgherrie Mountains' plant; also found by Roth and Parkyns in Abyssinia.

4. UMBILICUS PENDULINUS, *DC.*

Hab. Cameroons Mountains, alt. 7000–10,000 feet. (Fl. Nov.)

Apparently the same as the European plant, but rather more fleshy in habit, of a deeper green colour, and with the bracts often but not always, foliaceous, and varying greatly in size and in form

from linear to oblong-spathulate. A. Richard's Abyssinian *U. botryoides* is the same plant. The range of *U. pendulinus* is from Britain to Mogadore in N.W. Africa, and from Madeira and the Canary Islands, throughout the Mediterranean Sea to the Greek Archipelago, and Abyssinia.

5. CRASSULA (EUCRASSULA, *Harv. Fl. Cap.*) MANNII, *H.f.* Herbacea, caule brevi crasso robusto simplici basi glabro superne minute papilloso, foliis oblongo- v. cordato- v. lineari-lanceolatis in vaginam elongatam connatis ovato-lanceolatis margine papillis fimbrillatis, cymis ramosissimis densifloris, floribus parvis glaberrimis breviter pedicellatis, sepalis oblongo-ovatis obtusis, petalis oblongis obtusis eglandulosis basi subconnatis sepalis vix duplo longioribus, glandulis cuneato-quadratis.

Hab. Cameroons Mountains, alt. 6000–10,000 feet. (Fl. Dec.)

Herba 6–18 unc. alta, robusta, simplex, caule crassitie pennæ olorinæ et ultra, teres, foliosa. *Folia* valde varia, 1–4 unc. longa, interdum late ovato-subcordata, glaberrima, margine tenuiter fimbrillato excepto. *Cymæ* dense congestæ, in corymbum amplum compositum 3 unc. latum dispositæ. *Bracteæ* foliaceæ, sensim minores. *Flores* sub $\frac{1}{6}$ unc. diam.

Very nearly allied to *C. Abyssinica*, A. Richard; but the papillæ on the upper part of the plant are much shorter, the leaves less acute, the flowers considerably smaller, and both sepals and petals shorter, broader, and blunter.

6. KALANCHOË ÆGYPTIACA, *DC.* Glaberrima, foliis obovato-oblongis apice rotundatis in petiolum attenuatis grosse crenatis, paniculis amplis umbellatim cymosis multifloris, floribus $\frac{1}{3}$ unc. longis, sepalis lanceolatis acuminatis, corolla calyce triplo longiore tubo 4-gono urceolato ore angusto lobis oblongis acuminatis.

Hab. Cameroons Mountains, alt. 3000–7000 feet. (Fl. Dec., Jan.)

Herba elata, 4–6-pedalis, glaberrima. *Caulis* teres, superne trichotome ramosus, floribundus. *Folia* 3–4 unc. longa, in petiolum 1–1$\frac{1}{2}$ unc. long. attenuata, grosse crenata, siccitate venosa. *Cymæ* valde ramosæ, subumbellatæ, pedicellis gracilibus, bracteis bracteolisque anguste lanceolatis v. setaceis. *Flores* ut videtur aurantiaci. *Stamina* brevia. *Glandulæ* hypogynæ lineares. *Folliculi* membranacei, longe attenuati. *Semina* minuta, oblonga, flava.

So very nearly allied to *K. Ægyptiaca*, DC. Pl., Grasses, 64, that I hesitate to distinguish it specifically; but the leaves are coarsely crenate, and not toothed as represented in De Candolle's figure. That author, however, describes the leaves as crenate or sometimes entire. I have seen no authentic specimens of *K. Ægyptiaca*, which Forskahl describes (under the name of *Cotyle-*

don deficiens) as a native of Mount Melhan in Arabia (lat. 14° 40′ N., long. 44° E.), and adds that the plant is cultivated in Egypt. De Candolle erroneously considers Mount Melhan to be in Egypt.

Hochstetter and Steudel refer an Abyssinian tomentose *Kalanchoë* (*Schimperiana*, A. Richard, Fl. Abyss. i. 310) to Forskahl's *Cotyledon deficiens*; but no doubt erroneously, as A. Richard suspects.

From the Botanical Magazine figure (tab. 1436, sub *Cotyledone*) of *K. crenata*, Haw. Synops. 109, Mann's plant differs solely in the absence of any hairs, and the apparently darker-coloured flowers, the leaves being identical. *K. crenata* is a native of Western tropical Africa. De Candolle does not describe *K. crenata* as at all hairy.

20. CUCURBITACEÆ.

1. MUKIA, sp.?

Hab. Fernando Po, alt.? Cameroons Mountains, alt. 7000 feet. (Fl. Dec., Jan.) (Male fl. only.)

A similar and probably identical species is found in Abyssinia; it resembles a good deal the common Indian *M. scabrella.*

2. BRYONIA, sp.

Hab. Cameroons Mountains.

A very small-flowered species, not unlike *B. Americana* in habit.

21. UMBELLIFERÆ.

1. **HYDROCOTYLE MONTICOLA**, *H.f.*, n. sp. Pusilla, glaberrima, caule filiformi elongato, foliis breviuscule petiolatis peltatis orbiculatis basi bilobis 6–9-lobulatis, lobulis crenulatis, pedunculis brevissimis 2–4-floris, mericarpiis 1-costatis dorso acutis, stylis breviusculis.

Hab. Cameroons Mountains, alt. 8500 feet.

Caules tenuissimi, intertexti, 2–4 unc. longi. *Folia* $\frac{1}{6}$–$\frac{1}{3}$ unc. diam., sæpissime peltata, subtus interdum pilosula; petiolo $\frac{1}{8}$–$\frac{1}{2}$ unc. longo. *Pedunculus* $\frac{1}{16}$–$\frac{1}{12}$ unc. longus. *Fructus* $\frac{1}{24}$ unc. latus.

2. **HYDROCOTYLE MANNII**, *H.f.*, n. sp. Pilosa, caule tenui elongato, foliis modice petiolatis orbiculatis basi ad medium bilobis sinu angustissimo ambitu 7–9-lobis, lobis brevibus obtusis crenatis, pedunculis petiolis subæquilongis hirsutis, capitulis globosis multifloris, fructibus minimis, mericarpiis 1-costatis dorso acutis, stylis elongatis.—An *H. rotundifoliæ* Roxb. var.?

Hab. Fernando Po, alt. 7000 feet.

Caules 6–10 unc. longi, pilosi, novellis hirsutis. *Folia* $\frac{1}{3}$–$\frac{2}{3}$ unc. lata, utrinque longe setuloso-pilosa; petiolo $\frac{1}{2}$–$1\frac{1}{2}$ unc. longo; stipulis latis, membranaceis. *Capitula* $\frac{1}{10}$–$\frac{1}{8}$ unc. diam. *Fructus* $\frac{1}{30}$ unc. latus; stylo subæquilongo.—*H. rotundifoliæ* (Indiæ orientalis) proxima, sed stipulis amplis aliisque notis differt.

3. Sanicula Europæa, *L.* (*ante*, vi. 9).

Hab. Fernando Po, alt. 4000–7500 feet. Cameroons Mountains, alt. 4000–8500 feet. (Fl. Nov.–Feb.)

4. Agrocharis melanantha, *Hochst. in Flora*, 1844, i. 19. A. gracilis, *H.f.* (*ante*, vi. 9).

Hab. Fernando Po, alt. 7000 feet. Cameroons Mountains, alt. 7000–8000 feet. (Fl. Dec., Jan.)

The Cameroons Mountains' specimens prove that my *A. gracilis* is not even a constant variety of the Abyssinian plant. It attains a height of 4–6 feet.

5. Pimpinella oreophila, *H.f.*, n. sp. (*Gymnosciadium?*, *ante*, vi. 10). Pubescenti-tomentosa, foliis imparipinnatis, foliolis 1–4-jugis subtus pilosis lateralibus rhombeo- v. rotundato-ovatis crenatis terminali cordato, involucro 0, involucelli foliolis paucis filiformibus pedicellos æquantibus, petalis lacinia inflexa, fructu glaberrimo, mericarpiis 9-jugis.

Hab. Fernando Po and Cameroons Mountains, alt. 10,000 feet.

Herba erecta, statura variabilis, 4–10 unc. alta. *Petioli* 2–4 unc. longi. *Foliola* ⅓–½ unc. longa, subcoriacea. *Petioli* basi longe vaginantes. *Umbellæ* radii dense v. laxe tomentosi. *Flores* minuti. *Calycis* limbus obsoletus. *Fructus* ½–1¼ lin. longus, glaberrimus, jugis prominulis, vittis inter juga solitariis obscuris.

6. Peucedanum Petitianum, *A. Rich. Fl. Abyss.*

Hab. Fernando Po, alt. 9000–9500 feet. (Fl. Dec.)

The stem is more slender and geniculate, and the rays of the umbel shorter than in Abyssinian specimens.

7. Anthriscus Africanus, *H.f.*, n. sp. Elata, caule basi hispido-pubescente superne divaricatim ramoso, ramis gracillimis, foliis 3-foliolatis rarius pinnatis v. 2-ternatis, foliolis inferiorum petiolulatis late ovato-cordatis grosse inæqualiter dentatis superiorum lineari-lanceolatis serratis petiolis superne retrorsum hispidis, involucris 0, umbellæ radiis 3–5 filiformibus, fructu glaberrimo.

Hab. Cameroons Mountains, alt. 4000–7000 feet. (Fl. Feb.)

Herba 3–4-pedalis; caule gracili tereti sulcato, basi hispidulo, superne glaberrimo, laxe graciliter dichotome ramoso. *Petioli* graciles, petiolulique plus minus retrorsum hispido-pilosi; foliola membranacea, pilosula, 1–2 unc. longa, grosse inæqualiter dentata et sublobata. *Umbellæ* radii 3–4, 1½–2 unc. longi, striati, gracillimi; umbellulæ radii 3–5, fructiferi fere pollicares. *Flores* parvi. *Calycis* limbus obsoletus. *Petala* lacinia brevi inflexa. *Fructus* ⅙ unc. longus, glaberrimus, anguste ovoideus, mericarpiis teretiusculis glaberrimis, jugis inconspicuis; stylopodiis elongatis; stylis recurvis, filiformibus.

22. ARALIACEÆ.

1. **PARATROPIA MANNII**, *H.f.* (*ante*, vi. 10).

Hab. Fernando Po, alt. 5000 feet. Cameroons Mountains, alt. 5000–7000 feet. (Fl. Dec.–Feb.)

2. **PARATROPIA ELATA**, *H.f.*, n. sp. Glaberrima, foliis 5-foliolatis, petiolis petiolulisque gracilibus, foliolis ovato-cordatis acuminatis subserratis nervis conspicuis lucidis, umbellulis 4–6-floris pedunculatis secus ramos simplices elongatos inflorescentiæ racemosis.

Hab. Cameroons Mountains, alt. 7500 feet. (Fl. Feb.)

Arbor 50–60-pedalis, ramis crassis, lignosis. *Petioli* teretes, spithamæi, sulcati; petiolulis 2–3-pollicaribus. *Foliola* 4–7 unc. longa, superne inter nervos reticulatim venosa. *Stipulæ* membranaceæ, subvaginantes, axillares, basi intus ad basin petioli connatæ, coriaceæ. *Inflorescentia* terminalis. Axis crassissimus; bracteis vaginantibus coriaceis pubescenti-tomentosis: rami elongati, curvi, divaricati, 6–8 unc. longi, umbellas pedunculatas racemosim gerentes, rhachi pedunculisque glaberrimis: pedunculi unciales, basi bracteolati, bracteolis linearibus deciduis lanuginosis. *Flores* parvi, pedicellique glaberrimi. *Calyx* turbinatus, limbo truncato. *Petala* 5, ovata, subacuta. *Stamina* 5, petalis æquilonga; antheræ subglobosæ. *Stylus* conicus, apice 4–5-lobus. *Ovarium* 4–5-loculare.

A noble species, very similar to *P. Mannii*, but at once distinguished by the cordate, nerved leaflets and umbellate flowers.

23. LORANTHACEÆ.

1. **LORANTHUS (DENDROPHTHOË) OREOPHILUS**, *Oliver*, n. sp. Glaber, foliis suboppositis petiolatis ovato-lanceolatis acutis coriaceis, umbellulis axillaribus pedunculatis ∞-floris, floribus pedicellatis bracteola parva oblique cupulari suffultis, corolla basi tumida, filamentis apice in connectivo continuis.—*Oliv. MSS.*

Hab. Cameroons Mountains, alt. 6000–8000 feet. (Fl. Dec.)

Rami 2–3-pedales, robusti. *Folia* interdum alterna v. subverticillata, 2½–4 unc. longa, ¾–1¾ lata, petiolo ⅓–½ unc. longo. *Pedunculus* 3–10 unc. longus. *Corolla* ¼ unc. longa, lobis denique revolutis.—*Oliv.*

24. RUBIACEÆ.

1. **BACONIA MONTANA**, *H.f.*, n. sp. Glaberrima, foliis ovato- v. obovato-lanceolatis in petiolum angustatis acuminatis, corymbis puberulis, calycis lobis oblongis obtusis.

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.)

Frutex 6–8-pedalis. *Rami* teretes. *Folia* 4–6 unc. longa, lucida, petiolis ½–¾ unc. longis; stipulæ in cupulam brevem connatæ, abrupte subulatæ. *Corymbi* breviter pedunculati, subterminales, multiflori, 1–2 unc. lati. *Pedicelli* ⅛ unc. longi. *Alabastra* ¼–⅓ unc. longa, glabra. *Calycis* tubus turbinato-campanulatus; limbi lobi subrecurvi,

tubo æquilongi, decidui. *Corollæ* tubus brevis, fauce intus villosa; lobi elongati, imbricati. *Stamina* 4, filamentis brevibus; antheris elongatis, connectivo apice producto. *Stylus* brevis, in stigma elongatum subclavatum angulatum bipartibile desinens. *Ovula* septo peltatim affixa. *Baccæ* parvæ. *Semina* orbiculata, peltata, conchoidea, ventre valde intruso, marginibus cartilagineis. *Albumen* non ruminatum.

Allied to *B. corymbosa*; but the flowers are smaller and the calyx-lobes much longer.

2. IXORA, sp.
Hab. Cameroons Mountains, alt. 5000 feet. (Fl. Dec.)

This genus has not hitherto been found in Abyssinia. The Cameroons species resembles, but is not identical with, a Madagascar one, and is probably a nondescript.

3. VIGNALDIA OCCIDENTALIS, *H.f.*, n. sp. Caule basi suffrutescente erecto cum foliis subtus et inflorescentia tomentosis, foliis ovato-lanceolatis superne pubescentibus breviter petiolatis, stipulis in setas 5–7 tomentosas dissectis, cymis corymbosis densifloris, calycis laciniis subulato-lanceolatis tubo corollæ dimidio brevioribus, corollæ tubo elongato pubescente intus subvilloso, lobis linearibus, staminibus exsertis.
Hab. Fernando Po, alt. 8500 feet. Cameroons Mountains, alt. 7000–9000 feet. (Fl. Nov.–Jan.)
Frutex 3–4-pedalis. *V. Schimperianæ* Abyssiniæ simillima, sed differt lobis calycinis (floriferis et fructiferis) longioribus, tubo gracili corollæ dimidio brevioribus.

4. ANTHOSPERMUM ASPERULOIDES, *H.f.* (*ante*, vi. 11).
Hab. Fernando Po, alt. 10,000 feet. Cameroons Mountains, alt. 12,000 feet. (Fl. Dec., Jan.)

5. GALIUM ROTUNDIFOLIUM, *L.* (*ante*, vi. 11).
Hab. Fernando Po, alt. 10,000 feet. Cameroons Mountains, alt. 7000–12,000 feet. (Fl. Dec., Jan.)

6. GALIUM APARINE, *L.*, var. *hamatum*, H. f. (*ante*, vi. 11).
Hab. Fernando Po, alt. 10,000 feet. Cameroons Mountains, alt. 7000 feet. (Fl. Dec., Jan.)

25. DIPSACEÆ.

1. SCABIOSA SUCCISA, *L.*
Hab. Cameroons Mountains, alt. 10,500 feet. (Fl. Jan.)

A very robust form, but not otherwise to be distinguished from the European plant, which ranges from Iceland to Madeira and the Canary Islands, and from Spain to Asia Minor, the Caucasus, and Altai Mountains, but is nowhere found in Northern Africa.

26. COMPOSITÆ.

1. VERNONIA (STROBOCALYX) MYRIANTHA, *H. f.*, n. sp. Arborea, ramulis ultimis foliis subtus inflorescentiaque pubescentibus, foliis 8–10 unc. longis petiolatis lanceolatis eroso-dentatis acuminatis membranaceis, corymbis amplis ramosis polycephalis, capitulis 5-floris apices versus ramorum gracilium corymbi sessilibus subaggregatis, involucri squamis obtusis.

Hab. Fernando Po, alt. 4000–5000 feet. Cameroons Mountains, alt. 3000–7000 feet. (Fl. Dec.–Feb.)

Arbor parva, 20-pedalis. *Rami* crassi, læves. *Folia* superne glabra, subtus pubescentia, demum puberula v. glabrata, nervis utrinque plurimis. *Corymbi* valde ramosi, 6–10 unc. ampli, ramis gracilibus. *Capitula* $\frac{1}{3}$ unc. longa. *Involucri* squamæ glabræ, concavæ, valde coriaceæ, apicibus rotundatis brunneis. *Receptaculum* nudum, papillosum. *Flores* involucro duplo longiores. *Pappi* setæ rigidæ, scaberulæ. *Corolla* glaberrima. *Achenium* apicem versus pilosum.

2. VERNONIA (LEPIDAPLOA) BLUMEOIDES, *H. f.*, n. sp. Herbacea, dense griseo-pubescenti-tomentosa, ramis robustis simplicibus erectis, apice corymboso-ramoso, folioso, foliis 2–3 unc. long. densis erecto-patentibus subsessilibus lanceolatis acutis integerrimis supra scaberulis subtus nervis prominulis, corymbis dense tomentosis ramosis, capitulis $\frac{1}{2}$ unc. longis, involucro campanulato 20-floro, squamis ad 3–5-seriatis linearibus acutis 3-nerviis pubescentibus, pappi setis albis interioribus brevibus, achenio glaberrimo, receptaculo fimbrillifero.

Hab. Cameroons Mountains, alt. 4000–7000 feet. (Fl. Nov.–Jan.)

Herba 2–3-pedalis, subsimplex v. ramosa. *Folia* vix coriacea, $\frac{1}{2}$ unc. lata, siccitate fusco-viridia. *Corymbi* ampli. *Capitula* pedunculata. *Flores* purpurei.

3. VERNONIA? (LEPIDAPLOA) MANNII, *H. f.*, n. sp. Herbacea, elata, ramosa, foliis caulinis e basi ovata profunde cordata amplexicauli elongato-lanceolatis subtus molliter albo-lanuginosis, corymbis multifloris, capitulis $\frac{1}{2}$ unc. longis pedicellatis, involucri campanulati 30-flori squamis 3–4-seriatis lineari-lanceolatis longe ciliatis, pappi setis flavidis scabris 2-seriatis subæqualibus, acheniis glaberrimis, receptaculo lævi.

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec., Jan.)

Herba 6–10-pedalis; caule robusto, sulcato, superne pubescente, basi glabrato. *Folium* infimum unicum tantum a Mannio collectum a caulinis valde diversum (an ejusdem speciei?), 2-pedale, membranaceum, spathulato-lanceolatum, in petiolum late sinuato-alatum decurrens, margine denticulato, subtus griseo-tomentosum. *Folia* caulina 6–8 unc. longa, obtusa, denticulata, supra pubescenti-pilosa, subtus dense albo-villosa. *Corymbi* ampli, multiflori. *Flores* purpurei?, glabri, exteriores tenuiores. *Antheræ* exsertæ, bicaudatæ. *Achenium* teretiusculum, nec basi nec apice incrassatum v. dilatatum.

4. VERNONIA (LEPIDAPLOA) CLARENCEANA, *H.f.* (*ante*, vi. 11).
Hab. Fernando Po, alt. 7500–8500 feet. (Fl. Dec.)

5. STENGELIA CALVOANA, *H.f.*, n. sp. Ramulis velutino-pubescentibus, foliis caulinis lanceolatis sessilibus deorsum longe attenuatis basi auriculato-bilobis membranaceis acute dentatis, corymbis laxe 8–10-floris, capitulis late hemisphærico-campanulatis, involucri foliolis extimis linearibus herbaceis intermediis in laminam maximam oblongam dilatatis intimis coriaceis obtusis, pappi setis multiseriatis compressis pilosis, acheniis teretibus glaberrimis, receptaculo amplo plano lævi.
Hab. Cameroons Mountains, alt. 2500–7000 feet. (Fl. Dec.)
Suffrutex 8–12-pedalis. *Caulis* robustus, ramosus, sulcatus. *Folia* inferiora ignota, caulina 6–10 unc. longa, membranacea, superne glaberrima, subtus ad nervos pubescentia. *Capitula* longe pedunculata, 2 unc. diametr. *Involucri* squamæ crasse coriaceæ v. herbaceæ, basi confluentes, extimæ subsquarrosæ; intermediæ lamina oblonga ½ unc. longa, colorata; intimæ ∞-seriatæ, lineari-oblongæ, concavæ, coriaceæ. *Pappus* subrufescens, nitens. *Corollæ* cyaneæ; tubus gracilis, ore ampliato. *Stamina* exserta, antheris breviter caudatis.

A very fine species, allied to the following and to *S. Adoensis*, Schimp., but differing from both in the sessile cauline leaves with auriculate bases.

6. STENGELIA INSIGNIS, *H. f.*, n. sp. Ramulis robustis pubescentibus et glanduloso-pilosis, foliis graciliter petiolatis lanceolatis acuminatis basi anguste inæqualiter bilobis argute dentatis glaberrimis, corymbis laxe 10–12-floris, capitulis late hemisphærico-campanulatis, cæterum fere *S. Calvoanæ*.
Hab. Cameroons Mountains, alt. 3000–7000 feet. (Fl. Dec.)

A totally distinct species from *S. Calvoana*, differing in the glandular hairs of the stem and corymb, and the slender petioles of the much smaller leaves, which are attenuate at the base and there unequally bilobed. The capitula strongly resemble those of *S. Calvoana*; but the laminæ of the intermediate scales are smaller, shorter, and broader, and the innermost scales are less numerous, and have short, rather membranous appendages.

7. ADENOSTEMMA VISCOSUM, *Forst.* (*ante*, vi. 12).
Hab. Fernando Po, alt. 4000–8000 feet. Cameroons Mountains, alt. 7500 feet. (Fl. Dec.–Feb.)

8. MIKANIA CHENOPODIIFOLIA, *Willd.*
Hab. Cameroons Mountains, alt. 4000–7000 feet. (Fl. Dec.–Feb.)

A common tropical littoral plant on both coasts of Africa and in the Indian Archipelago.

9. **Microglossa densiflora**, *H. f.*, n. sp. Ramis teretibus, petiolis foliisque subtus glanduloso-pubescentibus, foliis 3–4 unc. long. petiolatis ovato-lanceolatis serratis longe acuminatis, corymbis densifloris, involucri campanulati squamis 3–4-seriatis obtusis marginibus ciliatis, floribus radii ligula elongata, pappo albido.

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec., Jan.)

Alte scandens. *Caulis* robustus, sulcatus. *Folia* membranacea, superne scaberula, subtus pubescenti-tomentosa; petiolo glanduloso-piloso, subvilloso. *Corymbi* ampli, densiflori. *Involucra* campanulata. *Flores* radii ligula tubo fere æquilonga.

Manifestly a species of *Microglossa*, though differing from the generic character in the much longer ligula of the ray-flowers and white pappus.

10. **Dichrocephala latifolia**, *DC.*

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Jan.)

11. **Dichrocephala chrysanthemifolia**, *DC.*

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Jan.)

This and the above are very common tropical weeds.

12. **Dichrocephala oblonga**, *H. f.* (*ante*, vi. 12).

Hab. Fernando Po, alt. 10,700 feet. (Fl. Dec.)

Possibly a form of *D. chrysanthemifolia*; but if so, a very peculiar one.

13. **Blumea alata**, *DC.*, var. *Natalensis*.

Hab. Cameroons Mountains, alt. 7000–8000 feet. (Fl. Dec.–Feb.)

A widely distributed and very variable African and Asiatic plant.

14. **Verbesina (Prestinaria) monticola**, *H. f.*, n. sp. Glaberrima, caule erecto subsimplici, foliis oppositis tripartitis lobis lanceolatis acuminatis inciso-serratis, capitulis graciliter pedunculatis, fl. radii amplis elongatis ∞-nerviis, acheniis planis lineari-oblongis margine et apice setosis, aristis 2 brevibus scabridis.

Hab. Cameroons Mountains, alt. 5000–7000 feet. (Fl. Nov.–Jan.)

Herba 1–3-pedalis. *Caulis* nodosus, crassitie pennæ corvinæ, rigidulus. *Folia* subcoriacea, cum petiolo 1½–2 unc. longa, 3-secta, lacinia media sæpe 3-fida. *Pedunculi* unciales et ultra. *Capitula* radio incluso 1½ unc. lata. *Involucrum* late hemisphæricum, squamis extimis linearibus foliaceis, interioribus late oblongis obtusis chartaceis nitidis, intimis sensim in paleas receptaculi lineares concavas floribus æquilongas strictas desinentes. *Fl. radii* fœminei, 1-seriales, ligula aurantiaca, ad 10-nerviis, tubo brevissimo piloso, achenio abortivo, stylo bifido. *Fl. disci* ∞, glaberrimi, achenio corollæ æquilongo, nitido, compressissimo, interdum intus scaberulo, marginibus cartilagineis. *Pappi* aristæ scabræ, setis erectis.

15. TELEKIA AFRICANA, *H.f.*, n. sp. Tota pubescenti-tomentosa, caule apice corymbifero, foliis omnibus petiolatis hastatis obtusis grosse sinuato-crenatis utrinque pubescentibus, involucri squamis linearibus subacutis.

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Jan.)

Herba erecta, 3–4-pedalis, caule robusto dense pubescenti-tomentoso. *Folia* alterna, 2–3 unc. longa, ad basin truncatam ¾–1 unc. lata, anguste oblongo-ovata, basi hastata, angulis obtusis v. in lobulum productis. *Corymbi* 5–10-flori. *Capitula* longe pedunculata, 1½ unc. lata. *Involucri* late hemisphærici squamæ pubescentes, herbaceæ. *Fl. radii* abortivi; corolla longe ligulata, aurantiaca, 6–8-nervis, apice integra v. dentata; styli rami subelongati. *Fl. disci* glaberrimi; antheræ breviter caudatæ; achenium glaberrimum, pappo brevi albo coroniformi dentato. *Receptaculum* conicum, squamis linearibus concavis flores amplectentibus.

Of the other three species of this genus, one ranges from Hungary to Southern Russia and the Caucasus, another is confined to Lombardy and the Tyrol, and a third to Asia Minor. The genus is, however, too nearly allied to *Buphthalmum* and *Asteriscus*, which have wider Mediterranean ranges.

16. HELICHRYSUM (XEROCHLÆNA) MANNII, *H.f.* (*ante*, vi. 12).

Hab. Fernando Po, alt. 10,000 feet. Cameroons Mountains, alt. 8000–13,000 feet. (Fl. Dec., Jan.)

Variat capitulis albis et aureis.

17. HELICHRYSUM (XEROCHLÆNA) FŒTIDUM, *Cass.* (*ante*, vi. 13).

Hab. Fernando Po, alt. 10,000 feet. Cameroons Mountains, alt. 4000–10,000 feet.

The Abyssinian *H. glutinosum*, A. Braun, seems to be a form of this species.

18. HELICHRYSUM (ACHYROCLINE) HOCHSTETTERI, *Schultz* (*ante*, vi. 13).

Hab. Fernando Po, alt. 8500 feet. Cameroons Mountains, alt. 7000–8000 feet.

19. HELICHRYSUM (CHIONOSTEMMA ?) CHRYSOCOMA, *Schultz*, var. *angustifolium*, H. f. (*ante*, vi. 13).

Hab. Fernando Po, alt. 10,000 feet. Cameroons Mountains, alt. 7000–11,000 feet. (Fl. Nov.–April.)

20. HELICHRYSUM (CHIONOSTEMMA ?) GLOBOSUM, *Schultz* (*ante*, vi. 13).

Hab. Fernando Po, alt. 10,000 feet. Cameroons Mountains, alt. 7000 feet. (Fl. Nov.)

21. **Helichrysum (Stœchadina) Biafranum**, *H. f.*, n. sp. Caule erecto virgato alato 10-pedali, laxe araneoso, foliis 2–3-unc. lineari-lanceolatis longe acuminatis sessilibus late décurrentibus marginibus recurvis, corymbis amplis ramosis, ramulis tenuibus multifloris, capitulis $\frac{1}{4}$ unc. longis aureis, involucro hemisphærico-campanulato, squamis 4–5-seriatis lineari-oblongis obtusis glaberrimis laxe imbricatis.

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.)

Herba elata, ramosa, gracilis, ramis elongatis, floriferis crass. pennæ anatinæ. *Folia* caulina $\frac{1}{3}$–$\frac{1}{2}$ unc. lata, patentia, utrinque laxe araneosa, basi longe et late decurrente, marginibus subintegerrimis, nervis 3 obscuris. *Corymbus* $\frac{1}{2}$-pedalis et ultra, ramis gracilibus sublaxe floriferis, pedicellis lanatis. *Involucri* squamæ ad 40, glaberrimæ, nitidæ, enerves, scariosæ, omnes exacte lineares, subacutæ. *Flores* ad 40. *Receptaculum* alveolatum. *Flores* radii tenues, ♀. *Pappi* pili tenues, scabruli.

22. **Gynura vitellina**, *Benth.* (*ante*, vi. 14), var. *gracilis*. Caule gracili, foliis angustioribus, capitulis minoribus, involucri squamis paucioribus.

Hab. Fernando Po, alt. 2000–8500 feet. Cameroons Mountains, alt. 7000 feet. (Fl. June–Nov.)

Also an Abyssinian plant.

23. **Senecio (Obæjaca) Clarenceanus**, *H. f.* (*ante*, vi. 14), var. β. Capitulis majoribus rubris v. albis.

Hab. Fernando Po, alt. 9000 feet. Cameroons Mountains, alt. 7000–11,000 feet. β. Cameroons Mountains, alt. 11,000 feet. (Fl. Dec.)

24. **Senecio (Arboreæ) Mannii**, *H. f.* (*ante*, vi. 14).

Hab. Fernando Po, alt. 6000 feet. Cameroons Mountains, alt. 2500–7500 feet.

25. **Senecio (Discoidei) Bojeri**, *DC.*

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Jan.)

Apparently the same as the Madagascar species.

26. **Senecio (Ecalyculati) Burtoni**, *H. f.*, n. sp. Herbaceus, elatus, caule robusto foliisque albo-araneosis, foliis caulinis lineari-oblongis v. elongato-oblongis acuminatis sessilibus basi decurrenti-auriculatis argute serrulatis, supremis ovato-lanceolatis, corymbis polycephalis glabratis, capitulis graciliter pedunculatis $\frac{3}{4}$ unc. longis, involucri basi tomentosi squamis extimis paucis filiformibus, interioribus anguste linearibus acuminatis late membranaceo-marginatis, ligulis aurantiacis capitulo æquilongis.

Hab. Cameroons Mountains, alt. 8000–12,000 feet. (Fl. Dec., Jan.)

Herba robusta, 3–4-pedalis, ramosa, ramis validis canaliculatis. *Folia* caulina spithamæa et ultra, subtus nivea, laxe lanata, supra araneosa,

lineari-oblonga multinervia, obtusa, dentibus marginalibus parvis callosis. *Fl. disci* 30–40, glaberrimi, pappo albo. *Achenia* brevia, costata, glaberrima. *Receptaculum* planiusculum.

A fine species, very nearly allied to the Abyssinian *S. Steudelii*, Hochst.; but it has more minutely toothed and coriaceous leaves: also allied somewhat to *S. alpinus, auratus*, &c., but more branched and robust, with sessile, much larger, and differently shaped leaves.

27. LACTUCA (SCARIOLA) CAPENSIS, *Thunb.*, var. *integrifolia, DC. Prodr.* vii. 136.

Hab. Cameroons Mountains, alt. 5000–7500 feet. (Fl. Nov., Dec.)

Certainly identical with the South-African plant, which extends throughout the Cape Colony to Natal, ascending in the latter country to 5000 feet.

28. LACTUCA (SCARIOLA) GLANDULIFERA, *H. f.*, n. sp. Glandulosa, hispidula, caulibus angulatim flexuosis, ramis apice divaricatim paniculato-ramosissimis, foliis ultra medium ovato-hastatis acutis denticulatis infra medium in petiolum late alatum basi cordato-bilobum abrupte contractis, pedunculis gracilibus ebracteatis, capitulis 3–4-floris, achenio rostro suo paulo longiore.

Hab. Cameroons Mountains, alt. 7000–8000 feet. (Fl. Dec.–Feb.)

Herba gracilis, scandens, 8-pedalis, diffuse ramosa, ramis paniculisque setis glandulosis sparsis. *Folia* 1 unc. longa, membranacea, utrinque pilosula. *Capitula* $\frac{1}{2}$ unc. longa, angusta, squamis extimis brevibus, interioribus e basi ovato-lanceolata longe linearibus apice incrassatis. *Pappus* albus. *Achenia* oblonga, acuta, utrinque medio longitudinaliter anguste 3–5-alata, rostro gracili.

Very near to the Abyssinian *L. paradoxa*, Schultz, in every respect but the glandular setæ of the stem and inflorescence.

29. SONCHUS ANGUSTISSIMUS, *H. f.*, n. sp. Caule erecto robusto glauco foliisque glaberrimis, foliis e basi lanceolato-hastata anguste elongatis sensim attenuato-acuminatis margine revolutis retrorsum aculeolatis integris v. lobulis 1–2 lineari-elongatis recurvis auctis, corymbo umbellato, pedunculis nudis, capitulis setosis basi lanatis.

Hab. Cameroons Mountains, alt. 7000–8000 feet. (Fl. Nov.–Jan.)

Herba 4–6-pedalis. *Caulis* erectus, crassit. digiti, striatus, glaucus, simplex. *Folia* spithamæa ad pedalia, vix $\frac{1}{3}$ unc. lata, subcoriacea, enervia, costa subtus prominula, lobis basi elongato-subulatis deflexis. *Corymbi* 8–12-cephali, pedunculis 1–3-cephalis, basi bracteis setaceis, glabris v. sublanatis, 1 unc. diametro. *Involucri* squamæ lineares, obtusæ, basi lana immersæ; exteriores setis subflexuosis hirsutæ. *Achenia* parva, oblonga, utrinque obtusa, lævia, brunnea, compressa, utrinque sub-6-costata, costis obscure transverse undulatis. *Pappus* albus.

A very distinct species, approaching *S. palustris* in habit. It is very nearly allied to a South African plant, of which I have seen only very bad specimens, and which wants the recurved aculei on the edges of the leaf.

30. **Anisoramphus hypochæroides**, *DC.?*
Hab. Cameroons Mountains, alt. 7000–13,500 feet. (Fl. Dec., Jan.)
Herbacea, erecta. *Radix* perpendicularis, fusiformis, perennis. *Folia* radicalia spithamæa, sessilia, a basi ad apicem sensim dilatata, vix 1 unc. lata, membranacea, apice rotundata, eroso-dentata, dentibus retrorsis. *Scapus* pilosulus, simplex v. apicem versus divisus, nudus, folio ovato-lanceolato basi auriculato 2-lobo auctus. *Capitula* $\frac{1}{2}$–$\frac{3}{4}$ unc. lata, longe pedunculata, pedunculo bracteolis paucis filiformibus aucto. *Involucrum* turbinato-campanulatum, foliolis 3–4-seriatis lineari-lanceolatis cum pedunculis viscoso-puberulis. *Receptaculum* fimbrilliferum. *Achenia* pappo pallide fusco æquilonga.

A remarkable plant, of which I have seen no original specimens (from South Africa); it is probably referable to *Hieracium*.

27. CAMPANULACEÆ.

1. **Wahlenbergia polyclada**, *H. f.* (*ante*, vi. 15).
Hab. Fernando Po, alt. 9000 feet. Cameroons Mountains, alt. 7000–8000 feet. (Fl. Dec., Jan.)

2. **Wahlenbergia arguta**, *H. f.* (*ante*, vi. 15).
Hab. Fernando Po, alt. 8500 feet. Cameroons Mountains, alt. 7000–9000 feet. (Fl. Dec.)

3. **Cephalostigma Perrotetii**, *A. DC. Prodr.* vii. 420. C. bahiense, *DC. l. c.* 421.
Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Nov., Dec.)

Also found on the Niger river by Barter; the Gaboon by Mann; in Senegambia by Perrottet; in South America, at Bahia, by Salzmann and Gardner; and at Tarapoto, Peru, by Spruce. It is clearly allied to the Abyssinian and Indian *C. hirsutum* (*Schimperi*, Hochst.), but differs in the calyx-lobes. Flowers blue.

4. **Lobelia (Tupa) columnaris**, *H. f.* (*ante*, vi. 14).
Hab. Fernando Po. Cameroons Mountains, alt. 7000 feet. (Fl. Dec., Jan.)
Herba 6-pedalis.

5. **Lobelia acutidens**, *H. f.*, n. sp. Glaberrima, caulibus tenuibus prostratis, foliis petiolatis ovatis v. ovato-rotundatis acutis grosse acute

dentatis, pedunculis axillaribus solitariis 1-floris foliis longioribus, calycis setulosi lobis ovato-subulatis corolla triente brevioribus.

Hab. Fernando Po, alt. 9000 feet. (Fl. April.)

L. Schimperi, Hochst., affinis et ejusdem magnitudinis; sed folia latiora, argute dentata; flores minores, et calycis lobi breviores et latiores.

28. ERICEÆ.

1. LEUCOTHOË ANGUSTIFOLIA, *β.* pyrifolia, *DC.* (*ante*, vi. 15).

Hab. Fernando Po, alt. 9000 feet. Cameroons Mountains, alt. 4000–8000 feet. (Fl. Dec., Jan.)

2. BLÆRIA SPICATA, *Hochst.* (*ante*, vi. 15).

Hab. Fernando Po, alt. 10,700 feet. Cameroons Mountains, alt. 7000–10,000 feet. (Fl. Nov., Dec.)

3. ERICINELLA MANNII, *H. f.* (*ante*, vi. 16).

Hab. Fernando Po, alt. 10,000 feet. Cameroons Mountains, alt. 4000–11,000 feet. (Fl. Dec.)

29. PRIMULACEÆ.

ARDISIANDRA, *H. f.*, gen. nov.

Calyx 5-partitus, laciniis triangulari-ovatis membranaceis acuminatis. *Corolla* calyce vix longior, campanulata, profunde 5-loba, tubo brevi, lobis oblongis ciliatis. *Stamina* 5, disco tenui annulari corollæ basi adhærente inserta, inclusa, filamentis brevibus subulatis; antheræ sagittato-ovatæ, acuminatæ. *Ovarium* superum, subglobosum; stylus gracilis, stigmate capitulato; ovula ∞. *Capsula* calyce inclusa, basi cum eo adhærente, depresso-globosa, apice dentibus 5–8 cartilagineis dehiscens. *Semina* ∞, angulata, testa brunnea granulata. *Embryo* transversus.—*Herba* repens, tenella, molliter pilosa, pilis flexuosis, caulibus prostratis. *Folia* sparsa, graciliter petiolata, ovato-rotundata, 3–5-loba v. subangulata, basi profunde cordato-biloba, grosse acute dentata, utrinque pilosula, 1 poll. diametro. *Flores* ¼ poll. lati, axillares, solitarii v. 2–3-ni, brevi-pedicellati; pedicellis basi bracteolatis, petiolo brevioribus, gracilibus; bracteolis setaceis. *Calyx* viridis, foliolis marginibus recurvis. *Corolla* alba, membranacea. *Capsula* pilosa, viridis, dentibus albis recurvis.

1. ARDISIANDRA SIBTHORPIOIDES, *H. f.* (Plate I.)

Hab. Fernando Po, alt. 7500 feet (fl. May). Cameroons Mountains, alt. 7000 feet (fll. Dec.).

Genus *Androsacæ* affine, differt habitu, antheris acuminatis, stylo elongato, capsula apice tantum dehiscente, et seminibus plurimis.

30. MYRSINEÆ.

1. **MÆSA INDICA**, *A. DC.* (*ante*, vi. 16).
Hab. Fernando Po, alt. 5000 feet. Cameroons Mountains, alt. 7000 feet. (Fl. and frt. Nov., Dec.)

2. **MYRSINE MELANOPHLŒOS**, *Br.*, *A. DC. Prodr.* viii. 97. An *M. Simensis*, Hochst., A. DC. *l.c.*?
Hab. Cameroons Mountains, alt. 4000–7500 feet. (Fl. Dec., Jan.)

31. LOGANIACEÆ.

1. **ANTHOCLEISTA SCANDENS**, *H. f.* (*ante*, vi. 16).
Hab. Fernando Po, alt. 5000 feet. (Fl. Dec.)

2. **NUXIA CONGESTA**, *Br. D.C. Prodr.* x. 435.
Hab. Cameroons Mountains, alt. 7000–7500 feet. (Fl. Dec., Jan.)
Arbor 30–40-pedalis. *Folia* variant acuta et obtusa in eadem stirpe.

An Abyssinian mountain species.

32. GENTIANEÆ.

1. **SEBÆA BRACHYPHYLLA**, *Griseb.* (*ante*, vi. 16).
Hab. Fernando Po, alt. 8500–10,000 feet. Cameroons Mountains, alt. 7000–8000 feet. (Fl. Nov., Dec.)

2. **SWERTIA PUMILA**, *Hochst.* Annua, glaberrima, caule erecto 4-gono angulis subcarinatis, foliis parvis obovatis v. obovato-spathulatis breviter petiolatis integerrimis obtusis, floribus longe pedicellatis 5-meris, sepalis oblongo-spathulatis obtusis corolla dimidio brevioribus, glandulis nectariferis 2 oblongis marginibus laxe setosis.
Hab. Cameroons Mountains, alt. 8000–10,000 feet. (Fl. Jan.)
Herba gracilis, spithamæa ad pedalem, subramosa. *Folia* parva, $\frac{1}{3}$–$\frac{3}{4}$ unc. longa, coriacea, crassiuscula; radicalia pauca. *Flores* subcorymbosi, longe graciliter pedicellati, $\frac{1}{2}$ unc. diametro, flavi. *Sepala* late v. anguste oblonga. *Glandulæ* nectariferæ incrassatæ, tumidæ.

Mann's smaller specimens differ from the Abyssinian in no respect; nor do his larger ones, except in size.

3. **SWERTIA MANNII**, *H. f.*, n. sp. Gracilis, annua, glaberrima, caule obscure 4-carinato, foliis lineari-lanceolatis obtusiusculis, floribus graciliter pedicellatis 5-meris, sepalis linearibus corolla 4-plo brevioribus, corollæ lobis lineari-oblongis, foveis nectariferis oblongis, marginibus longe fimbriatis.
Hab. Cameroons Mountains, alt. 7000–8000 feet. (Fl. Nov.–Jan.)
Spithamæa. *Folia* $\frac{1}{2}$–1 unc. longa, $\frac{1}{12}$ lata, crassiuscula. *Flores* fere $\frac{1}{2}$ unc. diametro, flavi. *Sepala* lobique corollæ quam præcedentis angustiora.

It is remarkable that this genus should be common in tropical mountainous Africa, but absent in South Africa: several Abyssinian species are described.

4. Swertia Clarenceana, *H. f.* (*ante*, vi. 16).
Hab. Fernando Po, alt. 8500–10,700 feet. Cameroons Mountains, alt. 6000–7000 feet. (Fl. Nov., Dec.)

The Cameroons Mountains specimens are much more slender than the Fernando Po ones, with rather larger flowers and smaller calyces, closely resembling *S. Abyssinica*, but the cauline leaves are not truncate at the base as in that plant. It may prove to be a form of *S. pumila*, which is extremely variable.

33. Boragineæ.

1. Cynoglossum micranthum, *Desf.*, *A. DC. Prodr.* x. 149. An *C. furcatum*, Forsk.?
Hab. Cameroons Mountains, alt. 7000–8000 feet. (Fl. Dec.)

Apparently the same as the Abyssinian and Indian plant, which is also found at Cape Palmas and in South Africa (*Echinospermum cynoglossoides*, Lehm, Drège in Hb. Hk.).

2. Cynoglossum lancifolium, *H. f.*, n. sp. Caule ramoso cum foliis hispido-pilosis, foliis caulinis late oblongo- v. ovato-lanceolatis valde acuminatis basi in petiolum angustatis superne pilis basi albo-pustulatis, racemis basi bracteatis, pedicellis hispido-tomentosis, florentibus floribus longioribus, fructiferis elongatis decurvis, floribus majusculis, calycis lobis breviter ovatis subacutis corolla multo brevioribus, corollæ lobis obtusis appendicibus bilobis glandulosis, acheniis depressis ambitu breviter glochidiatis.
Hab. Cameroons Mountains, alt. 7000–8000 feet. (Fl. Dec.)
Herba 3–4-pedalis. *Folia* caulina 3–4 unc. longa, 2–2½ unc. lata, nervis subparallelis. *Racemi* elongati. *Flores* cærulei, ⅓–½ unc. diametro. *Pedunculi* fructiferi fere unciales. *Achenia* subsolitaria, late ovato-orbiculata, ambitu glochidiata, glochidiis brevibus validis multiseriatis, facie superiore lævi leviter rugosa, inferiore glochidiata, cicatrice triangulari.

Allied to the Abyssinian *L. acutifolium*, Steud.; but the leaves are more lanceolate, long-acuminate, and the whole plant more hispid.

3. Myosotis stricta, *Link.* M. hispida, *Schlecht.*
Hab. Fernando Po, alt. 8500 feet. Cameroons Mountains, alt. 8000–10,000 feet. (Fl. Dec.)

34. Scrophularineæ.

1. Limosella aquatica, *L.*, var. *tenuifolia* (*ante*, vi. 19).
Hab. Fernando Po, alt. 9000–10,000 feet. (Fl. Dec.)

2. **Veronica (Veronicastrum) Mannii**, *H. f.* (*ante*, vi. 19).
Hab. Fernando Po, alt. 10,700 feet. Cameroons Mountains, alt. 7000–10,000 feet. (Fl. Dec.)

3. **Veronica (Chamædrys) Africana**, *H. f.*, n. sp. Pilosa, caule debili prostrato, foliis longe petiolatis ovatis obtusis grosse crenato-serratis, pedunculis folio subæquilongis 2-floris, sepalis oblongis obtusis pilosis capsula plano-compressa 2-loba pilosa longioribus.
Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.)
Herba habitu et facie *V. montanæ*. *Caules* debiles, 6–10 unc. longi, ubique pilosi. *Folia* pollicaria, utrinque pilosa, petiolo $\frac{1}{2}$ unc. longo. *Pedunculi* graciles, axillares. *Pedicelli* filiformes, $\frac{1}{4}$ unc. longi, bracteis linearibus. *Corolla* $\frac{1}{2}$ unc. diam., lobis late oblongis obtusis. *Capsula* calyce inclusa latior quam longa. *Semina* ∞, parva, oblonga, compressa, pallida, testa granulata. *Stylus* capsulæ æquilongus.

A very European form, and similar to *V. montana*, from which it differs in the smaller, more turgid capsules. It is also closely allied to *V. Petitiana* and *Abyssinica*, both of Abyssinia, which have shorter petioles, and leaves abrupt or cordate at the base.

4. **Sibthorpia Europæa**, *L.*, var. *Africana*. Flore purpureo.
Hab. Fernando Po, alt. 7500 feet. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.)

The European *Sibthorpia* has flowers part rose-coloured and part yellow; the var. *Africana* is stated to be yellow-flowered; but Mr. Mann describes those of his plant as purple. The species ranges from England to the Azores and Balearic Islands, Madeira, Peru, and Mexico.

5. **Celsia densifolia**, *H. f.*, n. sp. Caule erecto foliisque subtus pubescenti-tomentosis, foliis confertis breviter petiolatis anguste oblongo-lanceolatis crenulatis subacutis superne puberulis, racemo simplici stricto elongato multifloro glanduloso-pubescente, bracteis ovatis acuminatis denticulatis pedunculos fructiferos subæquantibus, calycis lobis lanceolatis acuminatis capsula brevioribus.
Hab. Fernando Po, alt. 8500 feet. (Fl. April.)
Caulis basi ramosus, ramis strictis subrobustis. *Folia* patentia v. reflexa, subimbricata, 2 unc. longa, superiora sensim breviora et magis ovata, supra reticulatim venosa. *Racemus* 1–2-pedalis, strictus, simplex. *Pedunculi* floriferi $\frac{1}{4}$ unc., fructiferi $\frac{1}{2}$ unc. longi, patentes, robusti. *Calycis* laciniæ $\frac{1}{4}$ unc. longæ. *Corolla* $\frac{1}{2}$–$\frac{2}{3}$ unc. diametro. *Filamenta* omnia villosa, loculis antherarum majorum breviter decurrentibus. *Capsula* ovoidea, ^{1} unc. longa. *Semina* minuta, pallida, profunde sulcata.

6. **Alectra Senegalensis**, *Benth. in A. DC. Prodr.* x. 339.
Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.)

Apparently the same as the Senegambian plant.

7. **Bartsia Abyssinica**, *Hochst., Benth. in A. DC. Prodr.* x. 545.
Hab. Cameroons Mountains, alt. 7000–9000 feet. (Fl. Nov., Dec.)

Quite the same as the Abyssinian plant, in habit, flowers, and foliage. The capsules are linear-oblong, and pubescent, but vary greatly in shape, sometimes broadly oblong.

8. **Sopubia trifida**, *Ham.*, var. β. *Madagascariensis,* Benth.? in A. DC. Prodr. x. 522.
Hab. Cameroons Mountains, alt. 6000–7000 feet. (Fl. Dec.)

Very similar to the Madagascar species, as also to the *S. Dregeana* of South Africa, *ramosa* of Abyssinia, and *filiformis* of Guinea, which may all belong to one species. It is, however, of a shorter and more robust habit than any of them—a difference possibly due to locality.

35. SOLANEÆ.

1. **Solanum nigrum**, *L.* Forma robusta, caule flexuoso tenuiter alato, floribus majusculis.
Hab. Cameroons Mountains, alt. 7000–10,000 feet. (Fl. Dec., Jan.)

2. **Solanum Indicum**, *L.*
Hab. Fernando Po, alt. 6000 feet. Cameroons Mountains, alt. 7000 feet. (Fl. Nov.–Jan.)

The *S. Adoense*, Hochst., of Abyssinia, seems to be the same plant.

3. **Discopodium penninervium**, *Hochst., A. DC. Prodr.* xiii. 478.
Hab. Fernando Po, alt. 4000 feet. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.–Feb.)

An Abyssinian mountain plant.

36. LENTIBULARINEÆ.

1. **Utricularia orbiculata**, *Wall.* (*ante,* iii. 187).
Hab. Cameroons Mountains, alt. 5000 feet. (Fl. Nov.)

Professor Oliver, who has examined this (and the following) for me, pronounces it to be absolutely identical with the Indian species (which ranges from Nepal and the Khasia Mountains to Ceylon and Malacca), even to the structure of the glochidiate seeds.

2. **Utricularia**, sp. Without flower.
Hab. Cameroons Mountains, alt. 4000–6000 feet. (Fl. Nov.)

A small, slender species, 2–5 inches long, with linear spathulate leaves 1½–2 inches long, and emitting distinct utriculiferous fibres from the root. Scape 1–2-flowered. Calyx-lobes very unequal: lower smaller, oblong-ovate, emarginate; upper ovate-lanceolate, rather obtuse.—D. O.

37. LABIATÆ.

1. PLECTRANTHUS (COLEOIDES) GLANDULOSUS, *H. f.* (*ante*, vi. 17).
Hab. Fernando Po and Cameroons Mountains, alt. 7000 feet. (Fl. Dec.–April.)

2. PLECTRANTHUS (GERMANEA) INSIGNIS, *H. f.*, n. sp. Elatus, ramosus, superne glanduloso-tomentosus, foliis amplis oblongo-lanceolatis membranaceis grosse dentatis, paniculis amplis, corollæ flavæ tubo basi gibbo, calyce post anthesin valde aucto.
Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.)
Herba 10–15-pedalis, aspectu *Salviæ* giganteæ. *Folia* pedalia, glabrata, superne secus nervos pubescentia, petiolo 1 unc. longo. *Paniculæ* late diffuse ramosæ, 2-pedales, ramis glacilibus glanduloso-pilosis et tomentosis. *Verticillastri* laxi. *Pedicelli* ¼–¾ unc. longi. *Flores* magni. *Calyx florifer* parvus, tubo brevi cylindrico, lobis subulatis recurvis. *Corolla,* ut videtur ex exemplaribus siccis, aurea, ½–¾ unc. longa, tubo basi contracto gibbo repente ampliato, labiis amplis. *Calyx fructifer* fere uncialis, glanduloso-pubescens, cylindricus, lente curvus, labio superiore ovato acuto marginibus recurvis; inferiore 4-fido, lobis lateralibus brevibus late ovato-subulatis, intermediis longe subulatis lente incurvis. *Nuces* magnæ, compressæ, late ovoideæ, glaberrimæ, læves.

A noble species, remarkable for its great size, Salvoid aspect, and golden flowers.

3. PLECTRANTHUS (ISODON) RAMOSISSIMUS, *H. f.* (*ante*, vi. 17).
Hab. Fernando Po, alt. 5000 feet. Cameroons Mountains, alt. 7000 feet.

4. PLECTRANTHUS (HETEROCALYX) DECUMBENS, *H. f.*, n. sp. Humilis, caule basi decumbente pubescenti-piloso, foliis ⅓ unc. longis petiolatis late ovatis obtusis grosse crenatis, racemo glanduloso-pubescente elongato simplici multifloro, verticillastris 8–10-floris, floribus breviter pedicellatis, calycibus parvis fructiferis hiantibus 2-lobis, pedicellis decurvis, corolla defracta calyce multo longiore.
Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Nov.)
Herba 1–2-pedalis, glanduloso-punctata, caule glanduloso-piloso. *Folia* subcoriacea, petiolo lamina breviore utrinque laxe piloso. *Racemi* 3–4 unc. longi, simplices, striati. *Verticillastri* subconferti, pedicellis ⅙ unc. longis, floriferis patentibus, fructiferis decurvis. *Calyx* fructifer,

parvus, tubo pubescente hemisphærico, limbi lobo superiore lato ovato obtuso recurvo, lateralibus parvis porrectis, inferiore adscendente oblongo obtuso superiori æquilongo apice retuso. *Corolla* ⅛ unc. longa, puberula, tubo brevi basi modice defracto, lobo superiore brevi, inferiore elongato anguste cymbiformi punctato. *Stamina* libera.

A small species, closely allied to *P. Palisoti*, but much smaller, the flowers more numerous, the lateral calyx-lobes larger, the lower one not biaristate, and the corolla is very many times the length of the calyx.

5. **Coleus (Aromaria) glandulosus**, *H.f.*, n. sp. 2–3-pedalis, laxe glanduloso-pilosus, foliis subsessilibus 1½–2 unc. longis ovatis subacutis grosse serratis, racemis simplicibus elongatis, verticillastris remotis dense 8–10-floris, floribus breviter pedicellatis, calycibus fructiferis pendulis, corollæ tubo gracili modice defracto limbo subæqualiter bilabiato longiore.

Hab. Cameroons Mountains, alt. 2500–7000 feet. (Fl. Nov., Dec.)

Caulis gracilis, laxe ramosus, pilis mollibus laxis. *Folia* nunc sessilia, nunc breviter petiolata, utrinque pilosa. *Racemi* floriferi 2–3-, fructiferi 8–10-pollicares, graciles, erecti. *Calyx* fructiferus clausus, deflexus, intus nudus, ¼ unc. longus, labio superiore lente recurvo ovato acuminato, inferiore 3-fido, dentibus subulatis. *Corolla* ¼–⅓ unc. longa. *Filamenta* in tubum connata.

I have a bad specimen of apparently the same plant collected in Abyssinia by Parkyns.

6. **Coleus (Solenostemon) tenuicaulis**, *H.f.*, n. sp. 6–12 unc. altus, laxe molliter glanduloso-pilosus, caule erecto ramoso, ramis gracilibus, foliis ¼–⅔ unc. longis petiolatis ovatis serratis, racemis elongatis compositis puberulis, pedicellis gracilibus racemoso-3–5-floris floribusque glanduloso-puberulis, calycibus minutis, fructiferis hemisphæricis oblique 5-fidis lobis subulatis, superiore recurvo, corollæ tubo brevi defracto, labio superiore brevi, inferiore elongato cymbiformi.

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.)

Statura valde variabilis, 2–12 unc., tenuis, annua. *Petioli* folio multo breviores. *Folia* utrinque subscabrulo-pilosa. *Racemi* interdum 8 unc. longi, laxe ramosi. *Calyx* fructifer ⅛ unc. longus, lente curvus, subhorizontalis, fauce glaberrima. *Corolla* ⅓ unc. longa, glabrata. *Filamenta* ad medium monadelpha.

7. **Coleus (Solenostemon) Mannii**, *H.f.*, n. sp. Glaberrimus nisi racemus puberulus, 2–3-pedalis, caule crasso 4-gono, foliis 1–1½ unc. longis petiolatis ovatis v. ovato-lanceolatis acutis grosse crenatis crassiusculis, racemo stricto erecto simplici, verticillastris 15-floris, pedicellis in phalanges 2 oppositas aggregatis gracilibus, calyce parvo, bi-

labiato hiante, corollæ tubo brevi defracto, labio superiore brevissimo, inferiore elongato cymbiformi.

Hab. Cameroons Mountains, alt. 5000–6000 feet. (Fl. Nov.)

Caulis robustus, glaberrimus, crassitie pennæ anatinæ, 4-gonus, internodiis brevibus. *Folia* purpureo variegata, lamina basi in petiolum brevem angustata. *Racemi* 4 unc. longi, stricti, graciles, pedicellis patentibus $\frac{1}{4}$–$\frac{1}{3}$ unc. longis. *Calyx* glanduloso-puberulus, lobo superiore recurvo obtuso, lateralibus minutis, inferiore superiorem æquante apice bifido; fauce glaberrima. *Corolla* $\frac{1}{3}$ unc. longa, glabra. *Filamenta* ad medium monadelpha.

The calyx of this plant is of the same form as that of *Plectranthus decumbens*, of which it is a near ally, but the monadelphous stamens remove it to *Coleus*.

8. Pycnostachys Abyssinica, *Fresen.* (*ante*, vi. 17).

Hab. Fernando Po, alt. 7000 feet. Cameroons Mountains, alt. 6000 feet. (Fl. Dec.)

Specimens from the Cameroons Mountains are more glabrous than those from Fernando Po, in this respect approaching the Madagascar *P. cærulea* and the S.-African *P. reticulata*. All may be forms of one.

9. Micromeria punctata, *Br., Benth. in DC. Prodr.* xii. 230.

Hab. Cameroons Mountains, alt. 7000–10,000 feet. (Fl. Dec., Jan.)

Certainly the same as the Abyssinian plant, and possibly a form of a South-European one.

10. Calamintha Simensis, *Benth.* (*ante*, vi. 18).

Hab. Fernando Po, alt. 8500 feet. Cameroons Mountains, alt. 7000–10,500 feet. (Fl. Dec.)

11. Nepeta (Pycnonepeta) robusta, *H.f.*, n. sp. Erecta, robusta, ramosa, pubescenti-hispidula, foliis breviter petiolatis ovatis obtusis grosse serratis coriaceis reticulatis, verticillastris in spicas densas cylindricas terminales dispositis, bracteis lanceolato-subulatis, calycem rectum tubulosum æquantibus, corollæ tubo exserto.

Hab. Cameroons Mountains, alt. 6000–8000 feet. (Fl. Nov., Dec.)

Herba 3–4-pedalis, caule valido, ramis crassitie pennæ anserinæ, pilis patulis subhispidis hirsuta. *Folia* 1–$1\frac{1}{2}$ unc. longa, rigidula, utrinque rugosa, supra glabra, subtus pilosa. *Cymarum* spicæ 1 unc. longæ, obtusæ, densifloræ. *Flores* breviter graciliter pedicellati, flavi?. *Calyx* $\frac{1}{6}$–$\frac{1}{4}$ unc. longus, 15-nervius, pilosus, dentibus subulatis. *Corolla* tubo pubescente exserto, lobis oblongis obtusis.

Closely allied to the Abyssinian *N. ballotifolia*, Hochst., which has broader bracts and much larger flowers.

12. **Stachys aculeolata**, *H.f.* (*ante*, vi. 18).
Hab. Fernando Po, alt. 9000 feet. (Fl. Dec.)

13. **Leucas (Hemistoma) deflexa**, *H.f.*, n. sp. Herbacea, ramosa, elata, cano pubescens, foliis lanceolatis dentato-serratis, verticillastris densifloris globosis, calycibus hispidis membranaceis ore repente deflexo dentibus 8–10 brevibus late ovatis setaceis.
Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Nov.–Feb.)
Herba 4–5-pedalis, caule robusto. *Folia* petiolata, 2–3 unc. longa, membranacea, basi attenuata. *Verticillastri* $\frac{3}{4}$–1 unc. diametro. *Bracteæ* calyci æquilongæ, rigidæ, setaceæ, ciliatæ. *Corolla* parva, galea villosa.

Allied to *L. urticæfolia* of Abyssinia, Arabia, and India, but differing remarkably in the foliage, and in the deflexed mouth of the calyx.

14. **Leucas (Loxostoma) oligocephala**, *H.f.*, n. sp. Herbacea, pubescenti-pilosa, caulibus ascendentibus gracilibus simplicibus, foliis parvis oblongo-lanceolatis obtusis grosse pauciserratis, verticillastris globosis subsolitariis, terminalibus longe pedunculatis, bracteis setaceis calycis dimidium æquantibus.
Hab. Cameroons Mountains, alt. 7000–8000 feet. (Fl. Nov.–Jan.)
Herba rigidula, 1–2-pedalis, ubique pilis patentibus v. deflexis subtomentosa. *Caules* subsimplices v. ramis paucis elongatis. *Folia* vix petiolata, $\frac{1}{2}$ unc. longa, subcoriacea, subtus nervis prominentibus, utrinque pilosa. *Verticillastri* foliis 2 brevibus involucrati, $\frac{1}{2}$–$\frac{3}{4}$ unc. diametro, densiflores. *Bracteæ* subulatæ, rigidæ, ciliatæ. *Calyx* tubulosus, incurvus, 2-labiatus, hirsutus, dentibus longe subulatis. *Corolla* parva, albo villosa.

A very distinct species, clearly belonging to Bentham's previously monotypic section *Loxostoma*.

38. PLANTAGINEÆ.

1. **Plantago palmata**, *H.f.* (*ante*, vi. 19).
Hab. Fernando Po, alt. 7500–8000 feet. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.)

39. POLYGONEÆ.

1. **Rumex Abyssinicus**, *Jacq.* (*Meisn. in DC. Prodr.* xiv. 68), var. Foliis subtus pilosiusculis.

Altogether the same as the Abyssinian plant, except that there are more scattered hairs on the under side of the leaf. The species is a native also of Bourbon, and of cornfields in Eastern tropical Africa (*Kirk*). Mann states that it attains a height of 8 feet. According to a note on Roth's Abyssinian specimen, the root is tuberous, and its juice is mixed with butter to give it a brick-red colour.

2. **Rumex obtusifolius**, *L.*, var. *Steudelii*. (R. Steudelianus, *Meisn. in A. DC. Prodr.* xiv. 56. R. Nepalensis, *Spreng.*, *Meisn. l. c.* 55. R. hamatus, *Trev.*, *Meisn. l. c.* 56.) Foliis lanceolatis, acuminatis basi angulatis, calycibus valvulis ecallosis setis utrinque 6–10 hamatis.
Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Nov., Dec.)

A very common tropical and intertropical form of the common *R. obtusifolius*, found abundantly in Abyssinia, South Africa, throughout the hilly parts of the East Indies, &c. It has very many names in systematic works. A. Richard, in his Abyssinian Flora, remarks that the leaves vary from attenuate to cordate at the base. In our specimen the upper are very acute.

3. **Polygonum Nepalense**, *Meisn.*, *A. DC. Prodr.* xiv. 128.
Hab. Fernando Po, alt. 7500 feet.

A common Indian and Abyssinian plant.

40. AMARANTHACEÆ.

1. **Achyranthes argentea**, *L.*
Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec., Jan.)

2. **Cyathula cylindrica**, *Moq.-Tand. in A. DC. Prodr.* xv. pl. 2, var. *Schimperiana*. C. Schimperiana, *Moq. l. c.* Foliis lanceolatis
Hab. Fernando Po, alt. 10,000 feet. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.–Feb.)

The original or short-leaved form of this same plant occurs in Madagascar, South Africa, and in East tropical Africa (Manganja range, Meller in Livingstone's Cape), but not in Abyssinia, where the form *Schimperiana* only occurs.

41. THYMELEÆ.

1. **Lasiosiphon glaucus**, *Fresen.*, *Meisn. in DC. Prodr.* xiv. 593.
Hab. Cameroons Mountains, alt. 7000–7500 feet. (Fl. Dec., Jan.)

Mann's plant has rather longer, narrow lobes to the perianth, than an Abyssinian specimen of what we take to be this plant (collected by Mr. Plowden), of which we have no authentic specimens.

2. **Peddiea parviflora**, *H. f.* (*ante*, vi. 20).
Hab. Fernando Po, alt. 5000 feet. (Fl. Nov.)

42. SANTALACEÆ.

1. **Thesium tenuissimum**, *H. f.* (*ante*, vi. 19).
Hab. Fernando Po, alt. 9000 feet. Cameroons Mountains, alt. 8000–9000 feet. (Fl. Nov.–Jan.)

43. EUPHORBIACEÆ.

1. **EUPHORBIA AMPLA**, *H. f.* (*ante*, vi. 20), var. *tenuior.* Ramulis tenuibus, foliis involucralibus minoribus.

Hab. Fernando Po, alt. 8500 feet. Cameroons Mountains, alt. 7000 feet. (Fl. Nov., Dec.)

The Cameroons specimens are of a slender variety of the Fernando Po species.

2. **PHYLLANTHUS**, n. sp.?

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Nov.–Feb.)

A common herbaceous erect form of the genus, which I cannot identify, but am unwilling to describe in the present entangled condition of the species hitherto known.

3. **CLAOXYLON MANNII**, *H. f.* (*ante*, vi. 20).

Hab. Fernando Po, alt. 5000 feet. (Fl. Oct.)

44. URTICEÆ.

1. **PARIETARIA MAURITANICA**, *L.*, var. *a. erecta*, Wedd. Monogr. 513 (*ante*, vi. 20).

Hab. Fernando Po, alt. 8000 feet. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.)

The leaves are 3-nerved from the very base; otherwise it more resembles *P. officinalis.*

2. **PARIETARIA DEBILIS**, *Fort.*, var. *β. diffusa*, Wedd. Monogr. 515.

Hab. Cameroons Mountains; no elevation given; with plants of the temperate region.

This has the fructiferous perigonium of *P. debilis*, but the terminal apiculus to the fruit of *P. Lusitanica.* The species is universally diffused.

3. **LAPORTEA (SCLEPSIA) ALATIPES**, *H. f.*, n. sp. Herbacea, grosse setigera, foliis ovatis acuminatis grosse dentatis, inflorescentia axillari, pedunculis elongatis, pedicellis fœmineis alatis flabellatim connatis, achenii margine incrassato.

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.)

Herba 3-pedalis, setis rigidis ubique horrida. *Folia* 4–5 unc. longa, petiolis gracilibus longiora. *Inflorescentia* ♂ foliis brevior, floribus glomeratis, 4-meris. *Infl.* ♀ foliis longior, ramis paniculatis subsecundis, ramulis divaricatis, pedicellis ¼ unc. longis in laminas flabelliformes connatis. *Fl.* ♀ apici pedicelli oblique impositus. *Perigonii* foliola 2, æqualia, oblique ovata, fructu non accrescentia, achenio dimidio breviora. *Achenium* $\frac{1}{10}$ unc. latum, compressum, suborbiculare, stylo brevi filiformi, marginibus late incrassatis, faciebus planis vix granulatis.

Very nearly allied to the Indian *L. terminalis*, but the inflorescence is lateral; and still more near to the American *L. Canadensis*, but the achenia have much broader wings; it differs further from both in the shorter stigma.

4. Elatostemma monticola, *H.f.*, n. sp. 6–8-pollicaris, caule tenui pubescenti-tomentoso, foliis alternis breviter petiolatis oblique obovato-oblongis grosse serrato-dentatis utrinque sparse setulosis, superiore basi acuto, inferiore obtuso, nervis primariis 2–3, stipulis lanceolatis, capitulis ♀ subsessilibus depressis.

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.)

Herba tenella. *Folia* 1–1½ unc. longa, membranacea, puberula et setulosa. *Capitula* ♀ ¼–⅓ unc. diametro. *Involucrum* membranaceum, multilobatum, multiflorum, lobis oblongis ciliatis. *Fl.* ♀ sessiles et pedicellati, conferti. *Perianthii* foliola lanceolata, setuloso-ciliata. *Achenium* ellipsoideum.

A very common form of the genus, resembling closely several mountain Indian species.

5. Pilea quadrifolia, *A. Rich.* Dioica, spithamæa, glaberrima v. sparse pilosula, caule erecto ramoso gracili, foliorum paribus æqualibus graciliter petiolatis ½–¾ unc. longis late ovatis acutis grosse crenato-serratis membranaceis, stipulis amplis late cordato-rotundatis; fl. ♂ in axillis glomerati, ♀ axillis supremis dense paniculatim conferti.—*Wedd. Monogr. Urt.* 199.

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.)

Species elegans, gracilis, læte virens. *Petioli* foliis subæquilongi. *Folia* basi 3-nervia. *Stipulæ* ⅙ unc. longæ. *Fl.* ♂ in axillis plurimis caulis dense congesti, majusculi, 3–5-meri, perianthii lobis 1 v. pluribus longe aristatis. *Fl.* ♀ in paniculas breves subterminales foliis 4 supremis involucratas dense aggregati, perpusilli, breviter pedicellati. *Perianthium* foliolum 1 oblongum (cætera in fructu evanida), achenio brevius. *Achenium* minimum, ovatum, compressum, subgranulatum, stigmate infra-apicali.

The female of this plant (from Abyssinia) is well described by Weddell. The male has long stems and uniform leaves throughout the plant; and the female has much shorter stems, with very few leaves, of which the four upper are subterminal and form a whorl, the lower are (by arrest) smaller, all more or less toothed in our specimens, but apparently sometimes quite entire in Abyssinian. A very closely allied, but larger species, with more effuse female panicles in the axils of all the leaves, is sent by Mann, from 4000 feet in Fernando Po.

6. Leianthus Wightii, *Weddell, Monog. Urt.* 280.

Hab. Fernando Po, alt. 7500 feet.

Apparently the same as the Indian species, which is also Abyssinian.

7. Urera?

Hab. Cameroons Mountains, alt. 5000 feet. (Fl. Dec.)

A tropical form of *Urticeæ*, of which there are male flowers only.

45. Piperaceæ.

1. Peperomia Mannii, *H. f.*, n. sp. Glabra, 4–6-pollicaris, caule gracili basi repente, foliis alternis breviter petiolatis ovato-rotundatis obtusis reticulatim nervosis minute ciliolatis, amentis solitariis subterminalibus strictis brevibus gracilibus.

Hab. Fernando Po, alt. 10,000 feet. Cameroons Mountains, alt. 7000–8000 feet. (Fl. Dec.)

Species parvula, *caule* gracili, subsimplici. *Folia* $\frac{1}{4}$–$\frac{1}{2}$ unc. longa, fere æque lata v. anguste oblonga, subcarnosa, subtus nigro-punctata, margine apicem versus villosulo. *Amenta* gracilia, breviter pedunculata, $\frac{1}{4}$–2 unc. longa, minute nigro punctata; squamæ orbiculatæ, peltatæ. *Stamina* 2, brevia, antheris parvis oblongis. *Stigma* globoso-capitatum.

This approaches closely the Indian *P. Heyneana*, but the leaves are always alternate and the whole plant almost perfectly glabrous. The *P. Abyssinica* is a much more robust and fleshy plant.

2. Peperomia monticola, *H. f.*, n. sp. Glaberrima, spithamæa ad pedalis, caule robusto, foliis alternis petiolatis elliptico-oblongis obtusis basi 3-nerviis carnosis, nervis crassis, amentis pedunculatis elongatis crassiusculis.

Hab. Cameroons Mountains, alt. 8000 feet. (Fl. Jan.)

Caules basi longe repentes, demum erecti, crassitie pennæ corvinæ. *Folia* 1–$1\frac{1}{2}$ unc. longa, elliptico- v. ovato-oblonga, in petiolum $\frac{1}{3}$–$\frac{1}{2}$ unc. longum attenuata. *Amenta* solitaria, terminalia et axillaria, pedunculata, simplicia, crassitie caulis v. tenuiora, 1–2 unc. longa; squamæ orbiculatæ, peltatæ.

A very common West-Indian type of the genus; also closely allied to *P. Courtallensis* β. of Ceylon (Thwaites's Enum. 292). It differs from *P. Vogeliana* in the obtuse leaves.

3. Coccobryon Capense, *Klotzsch*.

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.)

A South-African species; also found by Mann on the low ground of Fernando Po (alt. 1300 feet) and in St. Thomas's (alt. 4000–7000 feet). Kirk (Livingstone's Expedition) gathered the same plant at Dzomba, alt. 6500 feet.

46. MYRICEÆ.

1. MYRICA SALICIFOLIA, *Hochst.*, *A. Rich. Fl. Abyss.* ii. 277.

Hab. Cameroons Mountains, alt. 7000–8000 feet. (Fl. Dec., Jan.)

A tree 20–30 feet high, identical with the Abyssinian, which is described as a tall tree with variable foliage, growing in cold mountain districts.

47. CONIFERÆ.

1. PODOCARPUS MANNII, *H. f.*, n. sp. Foliis anguste elongato-lanceolatis 3–5-pollicaribus $\frac{1}{6}$–$\frac{1}{3}$ unc. latis lente falcatis acuminatis mucronatis 1-nerviis utrinque lucidis.

Hab. St. Thomas's Island, summit of the Peak, alt. 7500 feet.

Ramuli tenues, angulati. *Folia* subdisticha, coriacea, nervo latiusculo, petiolo basi semitorto.

The present discovery of Mr. Mann's negatives the observation of Brown, that Coniferous plants are absent in Western tropical Africa; and I may here remark that this indefatigable collector has also added *Laurineæ* to the same flora, an order equally supposed by Brown to be absent in that region of the globe. The present plant approaches so closely to the South-African *Podocarpus falcatus*, Br., that I should not be surprised if it merged into it; but the leaves are much larger, longer, flaccid, and lucid, and there are stomata on both surfaces of the leaf, which (according to Endlicher, Syn. Conif. 218) is not the case with *P. falcatus*. From the Cape *P. elongatus*, Hérit., which small-leaved specimens closely resemble, it differs in the lucid, very large, long, and acuminate leaves.

There is another species of *Podocarpus* in Abyssinia, referred to *P. elongatus* by A. Richard (Fl. Abyss. ii. 278), which is identical in foliage with the Cape plant, but which differs in the fruit being shortly stipitate.

MONOCOTYLEDONES.

48. ORCHIDEÆ.

1. LIPARIS CAPENSIS, *Lindl.* (*Zeyher*, 3887).

Hab. Cameroons Mountains, alt. 6000–7000 feet. (Frt. Dec.)

A small species, in fruit only, but clearly the same as *L. Capensis*.

2. BOLBOPHYLLUM (PTILOGLOSSUM) TENUICAULE, *Lindl. in Journ. Linn. Soc.* vi. 126.

Hab. Fernando Po, alt. 5000 feet.

3. BOLBOPHYLLUM (PTILOGLOSSUM) MANNII, *H. f.* Pseudobulbis teretiusculis elongatis 2-phyllis, foliis 4–6-pollicaribus linearibus, bracteis glumaceis distichis imbricatis, sepalis lanceolato-subulatis,

petalis parvis linearibus labello lineari-oblongo sepalis subæquilongo longe ciliato.

Hab. Cameroons Mountains, alt. 4000–5000 feet. (Fl. Dec.)

Caudex repens. *Pseudobulbi* 3–5 unc. longi, basi $\frac{1}{2}$ unc. lati. *Folia* $\frac{1}{2}$–$\frac{3}{4}$ unc. lata, obtusiuscula. *Scapus* 1–1$\frac{1}{2}$-pedalis, gracilis, erectus, strictus, spathaceo-bracteatus. *Racemus* 4–6-pollicaris. *Bracteæ* oblongæ, acutæ, concavæ, $\frac{1}{3}$ unc. longæ. *Flores* labello excepto glaberrimæ, bracteis paulo breviores. *Labellum* brevissime unguiculatum. *Columnæ* ramis longe setaceis.

4. BOLBOPHYLLUM (PTILOGLOSSUM) MONTICOLUM, *H. f.*, n. sp. Pseudobulbis oblongis pollicaribus tetragonis 2-phyllis, foliis 2–3-poll. linearibus, bracteis glumaceis distichis imbricatis, sepalis subulato-lanceolatis, labello lineari-oblongo v. subspathulato longe ciliato sepalis subæquilongo.

Hab. Cameroons Mountains, alt. 5000 feet. (Fl. Nov.)

Caudex repens. *Pseudobulbi* verisimiliter tetrapteri. *Folia* $\frac{}{4}$ unc. longa. *Scapus* foliis duplo longior, spathaceo-bracteatus. *Racemus* 1$\frac{1}{2}$-poll. *Bracteæ* ovato-oblongæ, acutæ, $\frac{1}{4}$ unc. longæ. *Flores* flavi ?, bracteis paulo breviores, iis *B. Mannii* valde similes, sed minores, labello a basi sensim lente dilatato, petalisque paulo latioribus.

5. BOLBOPHYLLUM (MONOPHYLLA) AURANTIACUM, *H. f.*, n. sp. Caudice valido, pseudobulbis brevibus late ovoideis 1-phyllis, folio lineari basi in petiolum teretem complicato, racemo elongato nutante, floribus aurantiacis secundis, bracteis lanceolatis membranaceis ovarium excedentibus, sepalis longe lanceolato-subulatis, petalis oblongis sepalis dimidio brevioribus, labello elongato-trulliformi recurvo glaberrimo petalis paulo longiore.

Hab. Cameroons Mountains, alt. 5000–6000 feet. (Fl. Nov.)

Caudex crassitie pennæ anatinæ. *Pseudobulbi* 1 unc. longi, ovoidei, basi plus minus tumidi, obtusi. *Folium* 4–5 poll. long., $\frac{1}{3}$–$\frac{3}{4}$ lat., obtusum. *Scapus* gracilis, spathaceo-bracteatus. *Racemi* 5–6-pollicares, multiflori. *Flores* fere $\frac{1}{2}$ unc. longi. *Bracteæ* membranaceæ. *Sepala* a basi sensim angustata, longe acuminata. *Labellum* oblongo-lanceolatum, longiuscule stipitatum, eglandulosum, superficie lævi, medio anguste sulcatum. *Columnæ* rami breves, subulati.

6. BOLBOPHYLLUM (DIPHYLLA) BIFARIUM, *H. f.*, n. sp. Caudice valido, pseudobulbis elongato-ovoideis pollicaribus tetrapteris 2-phyllis, foliis lineari-oblongis 3-pollicaribus, scapi bracteis imbricatis, racemo disticho, bracteis ovato-lanceolatis acuminatis patentibus flores excedentibus, sepalis e basi ovato-subulatis membranaceis, lateralibus deflexis, petalis parvis late oblongis undulatis, labello minimo crasso recurvo medio excavato apice truncato glanduloso.

Hab. Cameroons Mountains, alt. 5000 feet. (Fl. Nov.)

Caudex crassitie pennæ corvinæ. *Folia* sessilia, $\frac{1}{3}$ unc. lata. *Scapus* brevis, bracteis compressis distiche imbricatis acutis tectus. *Racemus* 3–4-pollicaris, rhachi valida angulata. *Bracteæ* fere $\frac{1}{3}$ unc. longæ, membranaceo-glumaceæ. *Flores* purpurei?, glaberrimi. *Sepalum* superius cucullatum, lateralia planiuscula. *Petala* membranacea. *Labellum* crasse carnosum, columna brevius, brevissime unguiculatum, basi latiusculum, in apicem crassum truncatum attenuatum. *Columna* alata, alis in processus 2 breves subulato-productis.

7. BOLBOPHYLLUM, sp.?
Hab. Cameroons Mountains, alt. 5000 feet. (Fruit only.)
Species parvula, *caudice* valido. *Pseudobulbi* breves, oblongi, tetrapteri, 2-phylli. *Folia* $1\frac{1}{2}$ unc. longa, lineari-oblonga, in petiolum contracta. *Scapus* brevis, validus. *Racemus* rhachi compressa v. angulata, robusta. *Bracteæ* parvæ. *Flores* parvi. *Sepala* ovato-subulata. *Petala* parva, linearia. *Labellum* crasse carnosum, recurvum, obtusum, excavatum. *Columna* aptera, ramis 2 subulatis porrectis.

8. ANGRÆCUM ARCUATUM, *Lindl.*
Hab. Cameroons Mountains, alt. 4000–6000 feet. (Fl. Nov.)

The same as the Cape of Good Hope species, which ranges from Uitenhage to Natal. Lindley identifies a much larger form, gathered by Mann on the banks of the Nun, with the same.

9. ANGRÆCUM, sp.
Hab. Cameroons Mountains, alt. 5000 feet. (Fruit only.)

Very similar to, but much smaller than, *A. capitatum*, Lindl. (*ante*, vi. 137).

10. POLYSTACHYA ALPINA, *Lindl.* (*ante*, vi. 131).
Hab. Fernando Po, alt. 6000 feet. (Fl. Dec.)

11–15. POLYSTACHYÆ species 5.
Hab. Cameroons Mountains, alt. 5000–6000 feet.

Of this genus, which abounds in tropical Africa, and of which one species reaches the Albany district of South Africa, there are five Cameroons Mountains species, occurring at elevations between 4000 and 6000 feet.

16. CALANTHE CORYMBOSA, *Lindl.* (*ante*, vi. 129).
Hab. Fernando Po, alt. 5000 feet. (Fl. Dec.)

17. DISA ALPINA, *H.f.*, n. sp. Caule gracili, foliis elongato-lanceolatis longe acuminatis 3-nerviis, spica densiflora, bracteis subulato-lanceolatis flores subæquantibus, sepalo postico late ovato obtuso calcari decurvo æquilongo, petalis late oblique ovatis obtusis, labello minimo lineari.
Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Nov.)
Herba gracilis, spithamæa ad pedalis, glaberrima. *Folia* caule paulo

breviora, $\frac{1}{6}$–$\frac{1}{2}$ unc. lata, subcoriacea, plana. *Spica* 2–3 unc. longa. *Sepala* et *petala* $\frac{1}{6}$ unc. longa, flava? *Columna* basi latiuscula, glandulosa.

18. Peristylus (Bifolii) tridentatus, *H.f.*, n. sp. Parvulus, foliis 2 orbicularibus ciliatis, scapo aphyllo villoso 3–4-floro, bracteis parvis subulatis, ovario retrorsum piloso, sepalis petalisque apice 3-dentatis, labello amplo dilatato 7-lobo villoso, calcari brevi conico acuto.

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Nov.)

Herba 3-pollicaris. *Folia* coriacea, subacuta, ut videtur cellulosa. *Scapus* robustus. *Flores* parvi. *Sepala* et *petala* subæqualia, pubescentia, $\frac{1}{10}$ unc. longa. *Labellum* sepalis longius, disco villoso utrinque lobulo aucto, apicem versus dilatatum 5-lobum, lobis ovatis. *Columna* brevis.

19. Habenaria debilis, *H.f.*, n. sp. Parvula, caule ovariisque glanduloso-pilosis, foliis 1 et 2 lanceolatis acuminatis, racemo 3–10-floro, bracteis ovario brevioribus, floribus parvis, sepalis petalisque late ovato-oblongis obtusis labello petalis subæquilongo 3-lobo, lobis lineari-oblongis obtusis, antheræ loculis contiguis, calcari recto ovario breviore.

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.)

Caulis 4–6-pollicaris, gracilis. *Folia* caule paulo breviora, plana, acuminata, in petiolum angustata. *Racemus* pauci- v. multiflorus. *Ovarium* subsessile, apice vix constricto. *Bracteæ* setaceo-lanceolatæ. *Perianthium* $\frac{1}{10}$ unc. latum, foliolis obtusiusculis. *Columnæ* processus breves, ascendentes, apice glandulosi.

20. Habenaria attenuata, *H.f.*, n. sp. Glaberrima, caule gracili pedali bracteato, foliis ad 2 lineari-lanceolatis, racemo elongato, floribus distantibus, bracteis ovario longioribus attenuato-acuminatis, sepalis petalisque ovato-oblongis obtusis, labello 3-partito lobis linearibus, calcari gracillimo ascendente ovario longiore, antheræ loculis contiguis.

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Nov.)

Caulis tenuis. *Folia* 2–5 unc. longa, $\frac{1}{3}$–$\frac{3}{4}$ lata, acuta, plana, non petiolata. *Bracteæ caulinæ* vaginantes, longe acuminatæ. *Racemus* 3–5-pollicaris. *Flores* laxi. *Ovarium* apice contractum. *Perianthium* $\frac{1}{6}$ unc. latum. *Labelli* lobi lineares, obtusi, petalis æquilongi. *Calcar* $\frac{1}{3}$–$\frac{1}{2}$ unc. longum, attenuatum. *Columnæ* processus breves, crassi, porrecti.

Very near the Abyssinian *H. bracteosa*, A. Rich., but the flowers are much smaller and the leaves narrower.

21. Habenaria microceras, *H.f.*, n. sp. Glaberrima, 1–2-pedalis, caule folioso basi vaginato, foliis oblongis utrinque acutis 7–9-nerviis, racemo elongato densifloro, bracteis ovario brevioribus, floribus minutis, sepalis petalisque late oblongis obtusis, labello brevi 3-fido, calcari tumido obtuso æquilongo, antheris contiguis.

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Nov.)

Exemplar solitarium. *Caulis* robustus, per totam longitudinem foliosus. *Folia* 5–6, 3–4 unc. longa, 2–3 lata, membranacea, non petiolata. *Racemus* post anthesin fere pedalis, floribus imbricatis. *Bracteæ* subulato-lanceolatæ. *Ovarium* apice contractum. *Perianthium* $\frac{1}{10}$ unc. latum. *Labellum* late oblongum, lobis brevibus obtusiusculis. *Columnæ* processus breves, crassi, obtusi, divergentes.

Habit of *H. prœalta*, but leaves much broader and flowers smaller.

22. HABENARIA PRÆALTA, *Lindl. Gen. et Sp. Orch.* 321, *et ante*, vi. 140.

Hab. Fernando Po, alt. 10,000 feet. (Fl. Dec.)

Also a native of Bourbon, if the same; but the Fernando Po plant has the spur much longer than the ovary and not at all clavate.

23. HABENARIA MANNII, *H. f.*, n. sp. Glaberrima, spithamæa, caule folioso basi vaginato, foliis lineari-lanceolatis acuminatis recurvis, bracteis late ovatis acuminatis ovario longioribus, floribus paucis amplis, sepalis falcato-ovatis acuminatis, petalis linearibus obtusis, labello angusto 3-partito, calcari æquilongo, lobis anguste linearibus, exterioribus multifidis, columna brevissima 2-cruri, antheris distantibus cruribus insertis.

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Nov.)

Caulis erectus, strictus, foliosus. *Folia* complicata, 3-nervia, 3–5-pollicaria, in bracteas floriferas abeuntia. *Bracteæ* concavæ, $\frac{3}{4}$ unc. longæ. *Flores* 1 unc. lati. *Sepala* 3-nervia, subcoriacea, patentia. *Labelli* lobi angustissimi. *Calcar* incurvum, $\frac{1}{2}$ unc. longum, sensim inflatum, obtusum. *Columna* (valde singularis) brevissima, in ramos 2 divaricatos et porrectos fissa, ramis cum processibus columnæ apice oblique truncatæ continuis. *Antheræ* loculi longe distantes, caudiculis erectis.

A most remarkable plant, very closely allied to three Abyssinian species, *H. Quartiniana*, *macrantha*, and *decorata*, in all of which the column is split to the base into two projecting arms, and the anther-lobes placed wide apart, one on each arm, with their caudicles turned up at right angles.

49. IRIDEÆ.

1. TRICHONEMA BULBOCODIUM, *Ker.*

Hab. Cameroons Mountains, alt. 7000–9000 feet. (Fl. Nov.)

A small-flowered form, in no way differing from the Abyssinian. The species is found from the Channel Islands to the Canaries and Azores, and throughout the Mediterranean region, Algeria, Asia Minor, Syria, and at Socotra in the Red Sea.

2. **Geissorhiza alpina**, *H. f.*, n. sp. Caule compresso 4–10-pollicari, 2–3-floro, foliis anguste lineari-elongatis 4–6-pollicaribus, bracteis ovato-oblongis acutis ovarium excedentibus capsulam æquantibus, perianthii limbo subobliquo laciniis oblongis obtusis.

Hab. Cameroons Mountains, alt. 9000–10,000 feet. (Fl. Nov.)

Herba gracilis, glaberrima. *Folia* stricta v. lente curva, $\frac{1}{10}$ unc. lata, costa valida. *Caulis* strictus v. parum flexuosus, foliis 2–3 spathaceis auctus. *Bracteæ* exteriores $\frac{1}{2}$ unc. longæ, strictæ, virides, marginibus membranaceis, interiores breviores, obtusæ, hyalinæ. *Flores* $\frac{3}{4}$ unc. longæ, ut videtur ex sicco pallide purpureæ. *Antheræ* parvæ. *Capsula* $\frac{1}{2}$ unc. longa, cylindrico-trigona, utrinque obtusa, membranacea, polysperma. *Semina* in quovis loculo ad 12, globosa, majuscula.

This resembles a good deal the *G. Abyssinica*, but is a more slender plant, with much fewer flowers, apparently of a very pale colour; the anthers, too, are smaller and straighter. It most resembles the South-African *G. juncea*.

50. HYPOXIDEÆ.

1. **Hypoxis villosa**, *L.*, var. foliis recurvis.

Hab. Cameroons Mountains, alt. 7000–7500 feet. (Fl. Nov.)

Apparently the same with the Cape, East-African, and Abyssinian species, but the leaves are rather more rigid and always recurved.

51. MELANTHACEÆ.

1. **Melanthium tenue**, *H. f.*, n. sp. 3–4-pollicare, caule tenui subunifolio 2-floro, folio anguste lineari caule longiore, perianthii foliolis lineari-oblongis obtusis medio purpureis basi vix saccatis, ovarii lobis in stylos rectos subulatos discretos sensim attenuatis.

Hab. Fernando Po, alt. 9000 feet. (Fl. April, May.)

Species parvula, facie omnino *Anguillariæ dioicæ*. *Bulbi* tunica lævis, papyracea, castanea. *Caulis* curvus v. subflexuosus, tenuis, basi vaginatus, supra basin 1-foliatus, et superne bractea basi tumida spathacea apice longe lineari auctus. *Folium* vix $\frac{1}{12}$ unc. latum, rigidum, enerve, concavum. *Flores* $\frac{1}{3}$ unc. diametro, albi, purpureo maculati.

A very distinct little species, of a peculiarly Cape genus, not hitherto found in Abyssinia.

52. COMMELYNEÆ.

1. **Commelyna**, sp.

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.) (Fruit only.)

Caulis tenuis, decumbens, linea pilorum auctus. *Folia* brevia, 1–1$\frac{1}{2}$ unc. longa, ovato-oblonga v. oblongo-rotundata, glabra, margine incrassato ciliato. *Vagina* tenuis, membranacea, marginibus longe villosis. *Spatha* breviter pedunculata, complicata, explicata latissime cordata, acuta, glaberrima, ciliolata, 2-flora.

Also an Abyssinian and Madagascar plant, very near *C. Forskahlii,* if not the same; but in the present condition of the genus *Commelyna* it is hopeless to identify a species in all its forms without a study of the whole.

2. CYANOTIS ABYSSINICA, *A. Rich.* (*ante,* vi. 21).
Hab. Fernando Po, alt. 9000 feet. Cameroons Mountains, alt. 7000–9000 feet. (Fl. Nov., Dec.)

Certainly the same as the Abyssinian plant, of which the tubers are eaten, and probably the same also with a Madagascar and S.-African one.

53. JUNCEÆ.

1. JUNCUS CAPITATUS, *Weig.*; *Kunth, Enum. Plant.* iii. 347.
Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.)

Identical with the European plant, except that the glumes are rather longer and more membranous; in form they do not differ, any more than the capsules and seeds. The Cameroons specimens are triandrous. This minute species is a native of Europe, from Norway to Spain, Madeira, and the Canary Islands, and from the Azores to Greece and Middle Russia; it has not been found in Abyssinia.

2. LUZULA CAMPESTRIS, *L.* (*ante,* vi. 22), var. *congesta.*
Hab. Fernando Po, alt. 8500–10,500 feet. Cameroons Mountains, alt. 10,000 feet. (Fl. Dec.)

Apparently identical with the European plant. The flowers are of a very dark colour. This form has not been detected in Abyssinia; but the South-African *L. Africana,* Drège, is referred to this variety by E. Meyer (Herb. Hook.).

54. CYPERACEÆ.

1. CYPERUS ELEGANTULUS, *Steud. Pl. Schimp.* sect. ii. no. 574.
Hab. Fernando Po, alt. 8500 feet.

This Abyssinian species is united by A. Richard with *C. atronitens,* Hochst., and perhaps rightly, but the scales are much larger and rather longer in outline.

2. CYPERUS INGRATUS, *Kunth, Enum.* ii. 31.
Hab. Fernando Po, alt. 6000–7000 feet. Cameroons Mountains, alt. 6000–7000 feet. (Fl. Dec.–April.)

I am unable to identify this species with any but the Cape of Good Hope *C. ingratus*; it varies greatly in size, the larger specimens resembling the Abyssinian *C. derreilema,* Steud., and the smaller some states of *C. bulbosus*; but the acute glumes distinguish it from both. The small, white, smooth, triquetrous achenium is very characteristic of the Cape and Cameroons Mountains plants.

3. CYPERUS ADOENSIS, *Hochst.*; *A. Rich. Fl. Abyss.* ii. 484.
Hab. Fernando Po, alt. 8500 feet. (Fl. April.)

The scales, described by A. Richard as being rarely mucronate in the Abyssinian plant, are always so in the Fernando Po specimens.

4. KYLLINGIA MACROCEPHALA, *A. Rich. Fl. Abyss.* ii. 490.
Hab. Fernando Po, alt. 7000–8500 feet. Cameroons Mountains, alt. 7000 feet. (Fl. Nov.–April.)

Identical with the Abyssinian plant.

5. ISOLEPIS CAPILLARIS, *Rœm. & Sch.*; *Kunth, Enum.* ii. 211. I. trifida, *Nees*; *Kunth, Enum.* ii. 213.
Hab. Fernando Po, alt. 8500–10,700 feet. Cameroons Mountains, alt. 6000–10,000 feet. (Fl. Nov.–April.)

A common tropical plant, found at various elevations, in America, Africa, and India, but not in South or North Africa. The *I. tenerrima*, Fisch., of South Russia is the same plant, I think.

6. ISOLEPIS SCHŒNOIDES, *Kunth, Enum.* ii. 209. Schœnus erraticus, *H.f.* (*ante*, vi. 22).
Hab. Fernando Po, alt. 8500–9000 feet. Cameroons Mountains, alt. 7000–9000 feet. (Fl. Nov.–April.)

This appears to me to be much nearer allied to *Schœnus* than to *Isolepis*. It is a native of mountain marshes in the eastern parts of the Cape Colony.

7. CAREX CRUCIATA*, *Nees?*; *Boott, Illustr. Carex,* t. 319. Foliis firmis.
Hab. St. Thomas's, summit of the Peak, alt. 7500 feet.

The original *C. cruciata* is a native of the Himalaya and Khasya ranges.

8. CAREX WAHLENBERGIANA, *Boott, Illustr. Carex,* t. 301 (*ante,* vi. 22).
Hab. Fernando Po, alt. 8000 feet. (Fl. Dec.)

A native of Bourbon, the Mauritius, and mountains of Abyssinia, at an elevation of 9000–10,000 feet.

9. CAREX BORYANA, *Schk.* (*ante*, vi. 22).
Hab. Fernando Po, alt. 7500–8500 feet. (Fl. Dec.)

A native of Bourbon and the Mauritius.

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* The Carices have all been named by the late Dr. Boott, F.L.S.

10. CAREX ÆTHIOPICA, *Schk.*; *Boott, Illustr. Carex*, t. 341–344.
Hab. Cameroons Mountains, alt. 7000–10,000 feet. (Fl. Dec.)

Also a native of Abyssinia and South Africa.

11. CAREX ECHINOCHLOE, *Kunth*; *Boott, Illustr. Carex*, t. 166.
Hab. Cameroons Mountains, alt. 7000 feet.

Also a native of Abyssinia, alt. 6000 feet, and probably not different from *C. Wahlenbergiana.*

55. GRAMINEÆ.

1. PANICUM (MILIARIA) HOCHSTETTERI, *Steud. Syn. Gram.* 90. P. trichanthum, *A. Rich.*, non *Nees.*
Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.)

Apparently a native of Abyssinia in mountain regions.

2. PANICUM (VIRGARIA) ACROTRICHUM, *H.f.*, n. sp. Debile, culmis gracilibus, vaginis foliisque ciliatis, foliis brevibus lanceolatis longe acuminatis planis longe pilosis, nervis 7–9, panicula laxa erecta, spiculis parvis apice setulis strictis valvulis acutis æquilongis terminatis.
Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.)
Gramen elegans, culmis 2–3-pedalibus foliosis lævibus, nodis glaberrimis. *Vaginæ* tenues, 2–3-pollicares, glaberrimæ v. pilosulæ, marginibus superne ciliatis, ore lanuginoso. *Folia* 2–4 poll. longa, $\frac{1}{3}$–$\frac{2}{3}$ lata, plana, membranacea, ciliata, paginis pilis pallidis elongatis rigidis sparsa. *Panicula* effusa, laxa, 4–8-uncialis, ramis geminis apices versus divisis rhachique subflexuosa filiformibus lævibus. *Spiculæ* parvæ, pallidæ, $\frac{1}{12}$ unc. longæ; valvulæ 5, exterior longitudine valde variabilis, quam secunda brevior, oblongo-lanceolata, obtusa, nuda v. setulis 1–2 aucta; secunda ovato-lanceolata, acuminata, viridis, 7-costata, apicem versus setosa, setis 2–3 terminalibus valvulam æquantibus; tertia secundæ subsimilis sed nuda; 2 intimæ cymbiformes, obtusæ, coriaceæ, albidæ, lævissimæ.

A delicate grass, easily recognized by the 2–3 long bristles at the apex of the second valve of the spikelet. It is more allied in habit and other characters to the Cape *P. æquinerve*, Nees, than to any species known to me, though that plant is placed in the section *Virgatæ.*

3. PANICUM (VIRGARIA) MONTICOLUM, *H.f.*, n. sp. Debile, culmis gracilibus, vaginis foliisque glabriusculis, foliis brevibus lanceolatis acuminatis planis striatis obscure 7-nerviis, panicula laxa pauciflora erecta, spiculis parvis oblongis obtusis glaberrimis.
Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Feb.)
Gramen elegans, culmis basi prostratis ramosis sulcatis demum ascendentibus 1–2-pedalibus foliosis lævibus, nodis glaberrimis. *Vaginæ* tenues, 1–2 unc. longæ, superne setulis curvis rigidis ciliatæ; ore glabro.

Folia $1\frac{1}{2}$–2 unc. longa, $\frac{1}{4}$–$\frac{1}{2}$ lata, plana, membranacea, viridia, marginibus non ciliatis, nervis primariis ad 7 a secundariis perplurimis vix distincta, nervulis paucis transversis trabeculatis, paginis lævibus. *Panicula* 2–3-pollicaris, laxa, ramis solitariis $\frac{1}{2}$-1-pollicaribus apices versus 1–2-floris; rhachi ramisque filiformibus lævibus. *Spiculæ* pedicellatæ, $\frac{1}{12}$ unc. longæ, glaberrimæ. *Valvula* exterior brevis, late ovata, apice rotundata; secunda et tertia consimiles, concavæ, oblongæ, obtusæ, læves, 5-nerves; 2 intimæ cymbiformes, coriaceæ, obtusæ, læves.

Similar in habit, &c. to *P. acrotrichum*, but at once distinguished by the glabrous leaves, fewer-flowered panicle, its solitary branches, and the glabrous, blunt, 5-nerved glumes, which are not ribbed.

4. Panicum (Miliaria) pusillum, *H. f.*, n. sp. Molliter laxe villosum, parvulum, debile, culmis decumbentibus filiformibus foliosis, foliis parvis lanceolatis, panicula laxa ovata ramosa, ramis deflexis 3–4-floris, ramis ramulisque flexuosis, valvulis 3 spiculæ costatis longe setosis.

Hab. Cameroons Mountains, alt. 7000–8000 feet. (Fl. Dec.)

Debile, annuum, pusillum, totum pilis mollibus patentibus elongatis laxe villosulum, culmis decumbentibus laxe foliosis fere capillaribus 2–3-pollicaribus, nodis non barbatis. *Vaginæ* $\frac{1}{6}$ unc. longæ, laxæ, costatæ. *Folia* $\frac{1}{4}$–$\frac{1}{3}$ unc. longa, anguste lanceolata, acuminata, plana, multicostata, utrinque villosula. *Panicula* pollicaris, erecta, ramis solitariis brevibus capillaribus. *Spiculæ* vix $\frac{1}{14}$ unc. longæ. *Valvulæ* 3 exteriores subæquales, membranaceæ, virides, ovatæ, acutæ, longe pilosæ, pilis basi tuberculatis; exterior 3-costata, paulo minor; 2 sequentes 5-costatæ, costis acutis; 2 intimæ cymbiformes, coriaceæ, glaberrimæ, læves, subacutæ.

A very remarkable little species, quite unlike any with which I am acquainted; its habit is that of *Isachne dispar*.

5. Isachne refracta, *H. f.*, n. sp. Fere glaberrima, culmis basi geniculatis decumbentibus demum erectis gracilibus strictis lævibus, vaginis lævibus sulcatis versus margines pilosulis, foliis refractis anguste lanceolatis longe acuminatis strictis scabrulis marginibus incurvis, panicula effusa, ramis strictis hic illic longe pilosis, valvulis ovatis subacutis valide costatis.

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.)

Gramen rigidulum, perenne, 3-unc. ad pedale, culmis cæspitosis basi decumbentibus ramosis. *Folia* stricta, $\frac{1}{2}$–2 unc. longa, omnia deflexa. *Culmi* superne gracillimi, lævissimi. *Panicula* 1–3-pollicaris, late ovata, fere æque lata, ramis alternis capillaribus flexuosis ramulis 1–4-floribus. *Spiculæ* pedicellatæ, $\frac{1}{12}$ unc. longæ, purpureæ, ovatæ, subacutæ. *Valvulæ* glabræ, exterior minor ovato-oblonga acuta 3-costata, 2 sequentes subæquales 5-costatæ; flosculus inferior (interdum neuter v. imperfectus) membranaceus; hermaphroditus 2-paleaceus, valvulis oblongis obtusis cymbiformibus coriaceis lævibus.

The refracted leaves and costate subacute glumes at once distinguish this remarkable species.

6. **Pennisetum (Gymnothrix) riparioides**, *Hochst.?*; *A. Rich. Fl. Abyss.* ii. 383.

Hab. Cameroons Mountains, alt. 7000–8000 feet. (Fl. Dec., Jan.)

The rachis and apex of the culm are more villous than in the Abyssinian specimen, but the plants are otherwise very similar; the whole genus, however, requires revision before the limits of this or any other species can be established. The spikelets are sometimes very lax and few, at others dense; the setæ are about as long as the glumes, and vary greatly in number.

7. **Vilfa montana**, *H. f.*, n. sp. Glaberrima, lævis, spithamæa ad pedalis, culmis cæspitosis simplicibus gracilibus erectis, foliis radicalibus curvis elongato-subulatis marginibus involutis scabrulis, panicula laxa ovata, ramis paucis verticillatis capillaribus apices versus 2–3-floris, spiculis glaberrimis nitidis, gluma inferiore superiore lanceolato acuminato ½ breviore, flosculo gluma superiore breviore.

Hab. Cameroons Mountains, alt. 7000–9000 feet. (Fl. Dec.)

Gramen elegans, perenne. *Folia* radicalia 1½–2 unc. longa, vix $\frac{1}{14}$ unc. lata, rigidula, patenti-recurva, e vagina brevissima sensim subulato-attenuata, sulcata. *Culmus* gracillimus, 1–2-foliatus, vaginis elongatis tenuibus sulcatis, ligula 0. *Panicula* 2 unc. longa, verticillis ad 6, rhachi ramisque capillaribus, infimis deflexis. *Spiculæ* ⅛ unc. longæ, fuscæ, nitidæ. *Gluma* inferior obtusiuscula, superior acuta.

A beautiful small grass, almost identical in the inflorescence, and size, structure, and colour of the spikelets, with the S.-African *V. centrifuga*, Nees; but the branchlets are only in threes, the leaves infinitely narrower, and the whole plant very slender: the two grasses are, however, most closely allied.

8. **Deyeuxia Mannii**, *H. f.*, n. sp. Culmis elongatis gracillimis foliosis 2–3-pedalibus, vaginis sulcatis scabrulis, foliis strictis anguste lineari-lanceolatis, ligulis elongatis fissis, panicula elongata effusa multiflora rhamis rachique capillaribus, glumis lanceolato-subulatis glabris enerviis carina scabrida, palea inferiore villosa apice breviter 4-setosa arista basilari palea subduplo longiore, superiore æquilonga apice 2-setosa basi villosa et setula villosa aucta.

Hab. Fernando Po, alt. 8500 feet. Cameroons Mountains, alt. 8000–13,000 feet. (Fl. Dec.–May.)

Gramen gracile, culmis fastigiatis, parce ramosis. *Folia* 6 unc. longa,

$\frac{1}{6}$ unc. lata, stricta, plana v. involuta, minute scabrula. *Panicula* 3–4 unc. longa, erecta v. inclinata, ramis ramulisque capillaribus. *Spiculæ* pallide purpureæ, nitidæ, $\frac{1}{6}$–$\frac{1}{4}$ unc. longæ, arista capillari.

The only species of the genus hitherto found in tropical or South Africa.

9. MICROCHLOA SETACEA, *Br.*; *Steud. Syn. Gram.* 202.
Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.)

Specimens very small and annual, possibly seedlings only; the flowers, &c., are identical with those of the Indian plant, which is found also in Australia, Abyssinia, S. Africa, S. America, and the plains of the Niger valley.

10. DESCHAMPSIA CÆSPITOSA, *Pal. Beauv.*, et var. *latifolia* (*ante*, vi. 23). D. latifolia, *Hochst.*; *A. Rich. Flor. Abyss.* ii. 413.
Hab. Fernando Po, alt. 9000–10,000 feet. Cameroons Mountains, alt. 10,000–12,000 feet. (Fl. Dec., Jan.)

11. AIRA CARYOPHYLLEA, *Linn.*
Hab. Cameroons Mountains, alt. 7000–10,000 feet. (Fl. Dec., Jan.)

Also a native of Abyssinia and S. Africa.

12. AIRA PICTIGLUMA, *Steud. Syn. Gram.* 221.
Hab. Cameroons Mountains, alt. 9000–13,500 feet. (Fl. Dec., Jan.)

Also a native of Abyssinia.

13. AVENA LACHNANTHA. Trisetum lachnanthum, *Hochst.* (*ante*, vi. 23).
Hab. Fernando Po, alt. 8000–9000 feet. Cameroons Mountains, alt. 7000–9000 feet. (Fl. Dec., Jan.)

This, having a hairy ovary, should, according to Steudel, be transferred to *Avena*. The villose character of the lower palea is variable. Also a native of Abyssinia.

14. AVENA NEESII. Trisetum, *Hochst.*; *Steud. Syn. Gram.* 227.
Hab. Cameroons Mountains, alt. 7000–8000 feet. (Fl. Dec., Jan.)

This also is an Abyssinian plant. The spikelets vary in size and colour; the lateral laciniæ of the lower palea are sometimes aristate, at others simply acuminate. Sheaths of the lower leaves glabrous, or a little hairy. Ovary villose.

15. LOUDETIA ELEGANS, *Hochst.*; *Steud. Syn. Gram.* 238.
Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec., Jan.)

A native of the mountains of Abyssinia.

16. DANTHONIA STREBLOCHÆTA, *Steud. Syn. Gram.* 245.
Hab. Cameroons Mountains, alt. 8000 feet. (Fl. Dec.)

These specimens of this very remarkable grass agree entirely with the Abyssinian. It differs from the generic character of *Danthonia* in the flowers much exceeding the glumes. The habit of the plant is that of *Festuca gigantea*, which it further closely resembles in colour, stature, and texture.

17. POA NEMORALIS, *L.*
Hab. Fernando Po, alt. 7500 feet. Cameroons Mountains, alt. 7000–10,000 feet. (Fl. Dec.–April.)

Not hitherto found in Abyssinia. There are two forms in the Cameroons Mountains: one like the ordinary European; the other, from a lower elevation, of greater size, with more effuse panicles, the branches usually solitary, elongated, and spreading.

18. KŒLERIA CRISTATA, *Pers.* K. convoluta, *Hochst.*; *Steud. Syn. Gram.* 293.
Hab. Cameroons Mountains, alt. 8000–12,000 feet. (Fl. Dec., Jan.)

A South-African and Abyssinian plant.

19. FESTUCA BROMOIDES, *Linn.*
Hab. Cameroons Mountains, alt. 7000–10,000 feet. (Fl. Dec.)

Common in Abyssinia and South Africa.

20. FESTUCA SIMENSIS, *Hochst.*; *Steud. Syn. Gram.* 314.
Hab. Fernando Po, alt. 8500 feet. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.–March.)

21. FESTUCA GIGANTEA, *Vill.*
Hab. Fernando Po, alt. 8500 feet. (Fl. March.)

A larger-flowered form than the European, with larger florets; but I can find no distinctive characters. The ovary is glabrous, with terminal stigma.

22. FESTUCA SCHIMPERIANA, *A. Rich.* (*ante*, vi. 23). F. restituta, *Steud. Syn. Gram.* 314.
Hab. Fernando Po, alt. 8500 feet. Cameroons Mountains, alt. 8000–13,500 feet. (Fl. Dec.–March.)

Varies extremely in stature, and in the inflorescence either dense or lax.

23. TRIPOGON MAJOR, *H.f.*, n. sp. Glaberrimus, foliis setaceo-involutis, spiculis ½-poll. 8–12-floris, glumis lanceolato-subulatis acuminatis, rhachi sericeo-villosa, palea inferiore tridentata breviter aristata.
Hab. Cameroons Mountains, alt. 7000–8000 feet. (Fl. Dec.)
Gramen cæspitosum, strictum, pedale et ultra. *Folia* 4–6-pollicaria, angustissima, strictiuscula, glaberrima v. pilis paucissimis conspersa,

ligula 0. *Culmus* lævis. *Spica* 4–6 unc. longa. *Spiculæ* remotæ, compressæ. *Glumæ* juniores integerrimæ v. obscure 3-dentatæ, demum apice erosæ, exterior rhachi oblique inserta. *Palea* inferior apice minute 3-dentata, arista brevi recta terminata, basi sericeo-barbata, cæterum glaberrima, 3-nervis; superior apice truncata, marginibus ciliolatis. *Ovarium* lineare, glaberrimum, stylis terminalibus divaricatis, stigmatibus brevibus plumosis.

Much the largest species hitherto discovered. The genus is an Indian, Senegambian, and Abyssinian one, but is not hitherto known in South Africa.

24. BROMUS SCABRIDUS, *H.f.*, n. sp. Elatus, gracilis, culmis scabridis, vaginis retrorsum pilosis et scabridis, foliis elongatis planis utrinque scabridis supra pilosis, panicula laxa ampla, ramis oppositis v. ternis 1–4-floris pedicellisque capillaribus et scabridis, spiculis amplis 6–8-floris, palea superiore valide 5-nervia pilosa et scabrula, arista terminali palea breviore recta.

Hab. Cameroons Mountains, alt. 7000–8000 feet. (Fl. Dec.)

Culmi 3–4-pedales, tenues, striati. *Vaginæ* graciles, sulcati, 6–8-pollicares, ligula brevi lacera. *Folia* caulina 4–6 unc. longa, ¼ lata, viridia, striata. *Panicula* erecta, pedalis, internodiis 4–5 distantibus, ramulis patentibus flexuosis 3–4-pollicaribus. *Spiculæ* pollicares, ⅓ unc. latæ, virides, nervosæ, flosculis compressis. *Glumæ* aristato-acuminatæ, scabridæ. *Palea* inferior ½-pollicaris, scabrida et pilosa, marginibus pectinato-ciliatis, arista fere terminali ¼ unc. longa. *Ovarium* apice villosum, stylis lateralibus.

A very handsome grass, nearly allied to *B. asper*, but more scabrid, with far larger and more strongly nerved compressed spikelets. It is also very nearly allied to the *B. cognatus*, Steud., of Abyssinia and *B. pectinatus*, Thunb., of South Africa.

25. BRACHYPODIUM SYLVATICUM, *R. & S.* (*ante*, vi. 23).

Hab. Fernando Po, alt. 7000 feet.

This is an Abyssinian plant (*B. flexum*, Nees), and also found in South Africa, India, and tropical America.

26. ANDROPOGON (GYMNANDROPOGON) DISTACHYUS, *L.*

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec., Jan.)

A native of South Europe and North Africa, as well as of Abyssinia. (*A. polyatherus*, Hochst.)

27. ANDROPOGON (GYMNANDROPOGON) BRACHYATHERUS, *Hochst.*?; *Steud. Syn. Gram.* 372.

Hab. Cameroons Mountains, alt. 8000 feet. (Fl. Dec.)

There are two forms thus marked from Abyssinia (Schimper): viz., No. 1635, a stout, broad-leaved form, tallying with the description of Steudel, of which I have very imperfect flowers; and another (Herb. Mus. Paris., Schimper, No. 95) with slender culms and very narrow, strict leaves. The Cameroons specimens accord best with the latter of these. The spikes are sometimes nearly 6 inches long. The second glume of the lower (sessile) spikelet is shortly awned both in Schimper's 95. and the Cameroons plants. The outer glume of the pedicelled spikelet is sometimes awned in the Cameroons specimens and sometimes muticous, but always awned in Schimper's 95. specimens.

28. ANDROPOGON (GYMNANDROPOGON) MANNII, *H. f.*, n. sp. Spithamæus ad pedalis, culmis cæspitosis simplicibus basi compressis foliosis apice sericeis, foliis distichis brevibus parce pilosis, vaginis latis compressis, lamina lineari acuta, spicis 2–5-pollicaribus rhachi ciliata, spiculis lanceolatis lævibus, inferioris basi barbatæ valvula exteriore acuminata subaristata, interiore aristata, arista glumam subæquante, superioris valvulis aristato-acuminatis.—*Ante*, vi. 23 (Gymnandropogon, sp?).

Hab. Fernando Po, alt. 8500–9000 feet. (Fl. Dec.–April.)

Glaberrima nisi pili sparsi in pagina superiore folii, apice culmi et rhachibus spicarum. *Vaginæ* 1 unc. longæ, $\frac{1}{6}$ unc. latæ, ligula brevissima sericea. *Folia* subcoriacea, stricta, 2 unc. longa, plana v. complicata, non convoluta. *Culmi* stricti, erecti, subrobusti. *Spicæ* purpurascentes. *Spiculæ* laxe imbricatæ, fere $\frac{1}{4}$ unc. longæ. *Flos* inferior *fœmineus*, superior *masculus*.

I cannot identify this with any described species, though it very closely resembles several Cape and African ones. Its short, stout, tufted habit, much compressed, glabrous, short sheaths, and short, stout, not convolute leaves distinguish it at once from the preceding.

29. ANDROPOGON (CYMBOPOGON) SMITHIANUS, *H. f.*, n. sp. Patentim pilosus v. glabratus, culmis 1–2-ped. foliosis apice ramosis, foliis elongatis superiorum vaginis inflatis, pedunculis longissime sericeis spathis inclusis, spicis 3–4 brevibus paucifloris densissime fulvo-villosis, spiculæ sessilis valvula exteriore truncata, interioris arista torta valvula duplo longiore.

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec., Jan.)

Gramen pulcherrimum, erectum. *Vaginæ* longe pilosæ, ligulis breviusculis membranaceis. *Folia* 4–8 unc. longa, $\frac{1}{6}$–$\frac{1}{5}$ lata, scabrula. *Pedunculi* plurimi, graciles, 2–3 unc. longi, apices versus patentim longe pilosi. *Spicæ* pollicares et breviores, densissime sericeo-villosæ, pilis fulvo-brunneis.

A most beautiful species, at once distinguishable by the dark yellow-brown silky hairs of the spikes.

30. **ANDROPOGON (CYMBOPOGON) PUSILLUS**, *H. f.*, n. sp. Annuus, patentim pilosus, culmis gracilibus decumbentibus 2–5-pollicaribus foliosis, vaginis compressis, foliis linearibus acuminatis planis, pedunculis spathis inclusis, spicis binis brevibus paucifloris, spicularum valvulis exterioribus tenuiter aristatis dorso profunde bipertusis, floris hermaphroditi arista valida torta spicula pluries longiore.

Hab. Cameroons Mountains, alt. 7000 feet. (Fl. Dec.)

Gramen humile, debile, culmis e basi ramosis. *Vaginæ* $\frac{1}{4}$–$\frac{1}{2}$ unc. longæ, ligula brevi obtusa. *Folia* $\frac{1}{2}$–1 unc. longa, stricta, $\frac{1}{8}$ unc. lata, utrinque longe pilosa et basin versus longissime ciliata. *Spathæ* 1–1$\frac{1}{2}$-pollicares, glabræ, pedunculos filiformes glaberrimos distachyos velantes. *Spicæ* (aristis exclusis) $\frac{1}{2}$ unc. longæ. *Spiculæ* 8–10; glumis glabris $\frac{1}{6}$ unc. long., rhachi pedicellisque dense subdistiche sericeo-villosis. *Valvulæ* nitidæ, virides, exteriores apice bifidæ, inter dentes aristatæ, arista tenui valvulæ æquilonga, punctis intrusis magnis collateralibus. *Arista* flosculi hermaphroditi 1–1$\frac{1}{2}$ unc. longa, valida, torta, brunnea, scabrula.

A most distinct and very singular little grass, quite unlike any other known to me.

31. **ARUNDINELLA ELEGANTULA**, *H. f.*, n. sp. 3–4-pollicaris, annua, longe laxe pilosa, foliis $\frac{1}{2}$-unc. lanceolatis acuminatis, panicula ovata ramis capillaribus flexuosis, glumis ovatis acuminatis longe pilosis, flosculi hermaphroditi palea inferiore bifida laciniis tenuiter aristatis dorso penicillis 2 pilorum aucta, inter lacinias aristata, arista valida torta spicula triplo longiore.

Cameroons Mountains, alt. 6000–7000 feet. (Fl. Dec.)

Gramen pusillum, debile, basi ramosum, longe laxe pilosum. *Culmi* basi decumbentes, tenues. *Folia* patentia, undulata v. recurva, ore longe ciliato. *Panicula* 1–1$\frac{1}{2}$-pollicaris, ramis plurimis flexuosis glaberrimis erecto-patentibus 2–3-floris ramulisque capillaribus. *Spiculæ* $\frac{1}{8}$ unc. longæ. *Glumæ* longe laxe patentim subsetosæ, setulis basi tuberculatis, ovatæ, acuminatæ. *Palea* inferior fl. masculi glumis subsimilis sed longior, apice aristulata; fl. fertilis palea inferior brevis, basi et supra medium utrinque penicillis albis sericeis pilorum aucta, aristis lateralibus tenuissimis, intermedia valida, torta, geniculata, $\frac{1}{4}$ unc. longa.

A very beautiful and distinct little grass, allied to the Abyssinian and Indian *A. Wallichii* (*A. pumila*, Steud.), but very different in its much smaller size, much larger, more hairy spikelets, and in the curious pencils of hairs on the lower fertile palea, which resemble those of the Australian *Danthonia semiannularis*. The

genus is South African, but not hitherto found in extratropical North Africa.

CRYPTOGAMIA.

56. FILICES.

1. GLEICHENIA DICHOTOMA, *Willd.*
Hab. St. Thomas's Island, summit of the Peak.

2. CYATHEA, sp.
Hab. St. Thomas's Island, alt. 3000–7000 feet. Fernando Po and Cameroons Mountains.

3. ADIANTUM ÆTHIOPICUM, *L.*
Hab. Cameroons Mountains, alt. 7000 feet.

4. LONCHITIS GLABRA, Bory.
Hab. St. Thomas's Island, top of the Peak. Cameroons Mountains, alt. 7000 feet. Fernando Po.

A native of Natal and Bourbon.

5. HYPOLEPIS PTERIDIOIDES, *Hook.*
Hab. Fernando Po and Cameroons Mountains, alt. 7000 feet.

6. CHEILANTHES FARINOSA, *Kaulf.*
Hab. Cameroons Mountains, in lava-fields, alt. 7000–10,000 feet.

7. PELLÆA HASTATA, *Link.*
Hab. Cameroons Mountains, alt. 7000 feet.

8. PTERIS 4-AURITA, *Retz.*
Hab. Cameroons Mountains, alt. 7000 feet.

9. PTERIS FLABELLATA, *Th.*
Hab. Fernando Po, alt. 7000 feet.

10. PTERIS AQUILINA, *Linn.*
Hab. Cameroons Mountains, alt. 7000 feet.

Also found at the level of the sea, on the Bagroo River and elsewhere in tropical Africa.

11. ASPLENIUM ANISOPHYLLUM, *Kze.*
Hab. Cameroons Mountains, alt. 3000–7000 feet.

12. ASPLENIUM ERECTUM, *Bory.*
Hab. Fernando Po and Cameroons Mountains, alt. 3000–7000 feet.

A fern of ubiquitous tropical distribution.

13. ASPLENIUM MONANTHEMUM, *L.*
Hab. Fernando Po, alt. 8000 feet.

14. **ASPLENIUM PROTENSUM**, *Schrad.*
Hab. Fernando Po and Cameroons Mountains, alt. 7000 feet.

A native of Abyssinia, Mauritius, and South Africa.

15. **ASPLENIUM SERRA**, *Langsd.*
Hab. Fernando Po and Cameroons Mountains, alt. 3000–7100 feet.

16. **ASPLENIUM FURCATUM**, *Th.* Var. parvula, pinnis integris brevibus.
Hab. Cameroons Mountains, alt. 8000 feet.

The same state occurs in the Canary and Cape de Verd Islands.

17. **ASPLENIUM ADIANTUM-NIGRUM**, *L.*
Hab. Cameroons Mountains, on lava-fields, alt. 10,000 feet.

Also found in Abyssinia, South Africa, and elsewhere on the tropical mountains of the Old and New World.

18. **ASPLENIUM ABYSSINICUM**, *Fée.*
Hab. Fernando Po and Cameroons Mountains, alt. 3000–7000 feet.

An Abyssinian fern.

19. **ASPLENIUM BRACHYPTERON**, *Kze.*
Hab. Cameroons Mountains, alt. 3000–7000 feet.

20. **ASPLENIUM FILIX-FŒMINA**, *L.*
Hab. Cameroons Mountains, alt. 7000 feet.

A small form of this very variable plant, of which other forms are found in Abyssinia, South Africa, &c.

21. **ASPLENIUM ASPIDIOIDES**, *Schl.*
Hab. Fernando Po and Cameroons Mountains, alt. 5000–7000 feet.

A Madagascar fern.

22. **ASPIDIUM ACULEATUM**, *L.*
Hab. Fernando Po and Cameroons Mountains, alt. 7000–10,000 feet.

Also found in Abyssinia, South Africa, and elsewhere throughout the globe where the climate is sufficiently cool.

23. **NEPHRODIUM CRINIBULBON**, *Hook.*
Hab. St. Thomas's Island, summit of the Peak. Cameroons Mountains, alt. 4000 feet.

24. **NEPHRODIUM FILIX-MAS**, *L.*
Hab. St. Thomas's Island, alt. 6000 feet.

A native of Abyssinia, Southern and Eastern Africa, and elsewhere throughout the world in cool moist climates.

25. NEPHRODIUM INÆQUALE, *Hook.*
Hab. Fernando Po and Cameroons Mountains, alt. 7000–10,000 feet.

26. NEPHROLEPIS TUBEROSA, *Presl.*
Hab. St. Thomas's Island and Cameroons Mountains, alt. 4000–5000 feet.

27. POLYPODIUM VILLOSISSIMUM, *Hook.*
Hab. St. Thomas's Island, alt. 6000 feet.

Also found at Sierra Leone.

28. POLYPODIUM RUGULOSUM, *Lab.*
Hab. Fernando Po, alt. 7000 feet.

One of the most widely distributed of Ferns in the tropics and south temperate zone.

29. POLYPODIUM, n. sp.
Hab. Cameroons Mountains, alt. 7000 feet.

30. POLYPODIUM OPPOSITIFOLIUM, *Hook.*
Hab. Peak of St. Thomas's Island, alt. 5000 feet.

31. POLYPODIUM LORIFORME, *Wall.*
Hab. Peak of St. Thomas's Island, alt. 4000–5000 feet. Fernando Po, alt. 3000–5000 feet.

32. POLYPODIUM LEPIDOTUM, *Willd.*
Hab. Cameroons Mountains, alt. 9000 feet.

An American fern; also found in St. Helena.

33. GYMNOGRAMME JAVANICA, *Bl.*
Hab. St. Thomas's Island, alt. 4000–5000 feet. Fernando Po, alt. 10,000 feet. Cameroons Mountains, alt. 3000–7000 feet.

A widely distributed fern, extending through India to the Sandwich Islands.

34. GYMNOGRAMME TOTTA, *Schlecht.*
Hab. Fernando Po and Cameroons Mountains, alt. 1000–7000 feet.

Found also in Madeira, throughout tropical Africa, and India.

35. GYMNOGRAMME LANCEOLATA, *Sw.*
Hab. Fernando Po and Cameroons Mountains, alt. 3000–7000 feet.

A native of South Africa, India, and South America.

36. ACROSTICHUM HYBRIDUM, *Bory.*
Hab. Fernando Po and Cameroons Mountains, alt. 4000–8000 feet.

A Bourbon and Tristan-d'Acunha fern.

37. **Acrostichum Aubertii**, *Desv.*
Hab. Fernando Po, alt. 7000 feet.

A Bourbon, East-African, and Venezuelan fern.

38. **Acrostichum splendens**, *Willd.*
Hab. Fernando Po and Cameroons Mountains, alt. 5000–6000 feet.

Found also in Sierra Leone, Madagascar, Bourbon, Ceylon, and the Sandwich Islands.

39. **Acrostichum squamosum**, *Sw.*
Hab. Cameroons Mountains, alt. 6000 feet. Tropical America, Indian and Pacific Islands, Madeira and Azores.

40. **Acrostichum sorbifolium**, *Linn.*
Hab. Fernando Po, from the sea to 5000 feet.

A very widely dispersed fern.

57. Ophioglosseæ.

1. **Ophioglossum reticulatum**, *Linn.*
Hab. Fernando Po, summit of the Peak.

A form of *O. vulgatum*, found in many warm countries.

58. Lycopodiaceæ.

1. **Lycopodium crassum**, *Hook.*
Hab. Cameroons Mountains, alt. 10,500 feet.

Also a native of Bourbon, Kerguelen's Land, and the Andes.

2. **Selaginella**, sp.
Hab. Fernando Po, alt. 8000 feet.

3. **Selaginella**, sp.
Hab. St. Thomas's Island, alt. 5000 feet.

59. Musci. (Described by Mr. Mitten, *ante*, p. 148.)

		feet.
Leptotrichum capillaceum, *Hedw.*	Cameroons Mountains	7,000
Dicranum obliquatum, *Mitt.*, n. sp.	Clarence Peak.	
—— stramineum, *Mitt.*, n. sp.	Cameroons Mountains	9,000
—— nivale, *Brid.*	”	9–10,000
—— ericetorum, *Mitt.*	”	7–10,000
Didymodon radicosus, *Mitt.*, n. sp.	”	8,000
—— pungens, *Mitt.*, n. sp.	”	10,000
Didymodon flexifolius, *Hook. & Tayl.*	” Clarence Peak, in the crater.	8,000

		feet.
—— purpureus, *Hedw.*	Cameroons Mountains	8,000
—— cyathicarpus, *Mont*	„	8,000
Anœctangium spathulatum, *Mitt.*, n. sp.	„	8,000
Tortula cylindrica (Weissia, *Bruch*)	„	7,000
Grimmia Abyssinica, *Br. & Sch.*	„	12,000
Zygodon semitortus, *Mitt.*, n. sp.	„	8,000
Macromitrium levatum, *Mitt.*, n. sp.	„	8–10,000
Entosthodon curvipes, *C. Muell*	„	7–8,000
Funaria hygrometrica, *Dill*	„	7,000
Bartramia stricta, *Brid.*	„	7,000
—— commutata, *Mitt*	„	12,000
—— Halleriana, *Hedw.*	„	9,000
Philonotis Wilsoni, *Br. & Sch.*	Clarence Peak	8,500
Breutelia gnaphalea, *Mitt.*	Cameroons Mountains	12,000
—— diffracta, *Mitt*	„	5–9,000
Mielichhoferia ovalis, *Mitt.*, n. sp.	„	10,000
—— basilaris, *Br. & Sch*	„	7–8,000
Bryum julaceum, *Sm.*	„	7,000
—— argenteum, *L.*	„	8,000
—— alpinum, *L.*	„	12,000
—— pallescens, *Schw*	„	7–12,000
—— flexifolium, *Br. & Sch.*	„	8,000
—— suberectum, *Mitt.*, n. sp.	Clarence Peak.	
—— subuliferum, *Mitt.*, n. sp.	Peak of St. Thomas's.	
Hypnum vellereum, *Mitt.*, n. sp.	Cameroons Mountains	8,000
—— spiculosum, *Mitt.*, n. sp.	„	(no elev.)
Meteorium imbricatum, *Beauv.*	„	4–7,000
	Clarence Peak	8,000
Trachyloma stipitatum, *Mitt.*, n. sp.	„	7,500
Stereodon Abyssinicus, *Br. & Sch.*	Cameroons Mountains	7–8,000
—— mollicellus, *Mitt.*, n. sp.	„	4–5,000
—— nitidifolius, *Mitt.*, n. sp.	Clarence Peak	8,000
—— fruticellus, *Mitt.*, n. sp.	„	3–8,000
—— frondosus, *Mitt.*, n. sp.	„	3–8,000
Lepidopilum deflexum, *Mitt.*, n. sp.	Cameroons Mountains	4,000
Neckera longirostris, *Hook*	„	7,000
—— ramulosa, *Mitt.*, n. sp	„	4,000
—— pennata, *Hedw.*	Clarence Peak	6,000
—— remota, *Br.*	Cameroons Mountains	7,000
Hedwigia imberbis, *Hook. & Tayl.*	„	10–12,000
—— rupestris, *Mitt.*, n. sp.	„	10,000
Leskea intricata, *Mitt.*, n. sp.	„	7,000
—— ramusculosa, *Mitt.*, n. sp.	Clarence Peak.	
Rhacopilum Africanum, *Mitt.*, n. sp.	Cameroons Mountains	7,000
Fissidens viridulus, *Schw.*	„	7,000

		feet.
Mnium rostratum, *Schw.*	Clarence Peak.	
Daltonia patula, *Mitt.*, n. sp.	„	7,000
—— longinervis, *Mitt.*, n. sp.	Cameroons Mountains	4,000
—— splachnoides, *Hook. & Tayl.*	„	8,000
Cyclodictyon (Hookeria) lætevirens, *Hook. & Tayl.*	Clarence Peak	8,000
Hypopterygium laricinum, *Hook.*	„	
Polytrichum Simense, *Br. & Sch.*	Cameroons Mountains	8–10,000
—— juniperinum, *Hedw*	„	8–10,000
—— commune, *Linn.*	Clarence Peak	15,000

60. HEPATICÆ. (Described by Mr. Mitten, *ante*, p. 164.)

Jungermannia dentata, *Raddi*	Cameroons Mountains	7,000
—— hirtella, *Weber*	„	7,000
—— Abyssinica, *Nees*	„	7,000
—— geminifolia, *Mitt.*, n. sp.	Peak of St. Thomas's.	
Plagiochila squamulosa, *Mitt.*, n. sp.	Cameroons Mountains	7–8,000
—— dichotoma, *Nees*	„	4,000
Leioscyphus repens, *Mitt.*, n. sp.	Clarence Peak	8,000
Lophocolea devexa, *Mitt.*, n. sp.	Peak of St. Thomas's.	
—— bidentata, *Nees*	Clarence Peak	8,000
—— muricata, *Nees*	„	8,000
Gymnanthe decipiens, *Hook.*	„	8,000
—— biloba, *Mitt.*, n. sp.	„	8,000
Physiotium sphagnoides, *Hook.*	Peak of St. Thomas's.	
Sendtnera juniperina, *Sw.*	„	
—— diclados, *Endl.*	Clarence Peak.	
Radula bipinnata, *Mitt.*, n. sp.	Cameroons Mountains	4,000
—— tamariscina, *Mitt.*, n. sp.	Peak of St. Thomas's.	
—— voluta, *Tayl.*	Cameroons Mountains	8,000
Madotheca subdentata, *Mitt.*, n. sp.	„	4,000
Lejeunia acuta, *Mitt.*, n. sp.	Clarence Peak.	
—— Montagnei, *Gottsche*	Peak of St. Thomas's.	
Frullania emergens, *Mitt.*, n. sp.	Cameroons Mountains	8,000
—— depressa, *Mitt.*, n. sp.	„	8,000
—— cordata, *Mitt.*, n. sp.	„	8,000
—— angulata, *Mitt.*, n. sp.	„	8,000
Plagiochasma Aitonia, *Lndb. & Nees*	„	7,000
Dumortiera hirsuta, *Schw.*	„ Clarence Peak.	4,000
Targionia hypophylla, *Linn.*	Cameroons Mountains	7,000
Anthoceros dichotomus, *Raddi*	„	7,000
Dendroceros crispatus, *Nees*	Peak of St. Thomas's.	

61. Lichenes. (Named by Dr. Nylander.)

		feet.
Leptogium Burgessii, *Lightf.*	Cameroons Mountains	7,000
—— inflexum, *Nyl.*	”	
Stictina quercizans, *Mich.*	”	
—— fuliginosa, *Dicks.*	”	
Peltigera polydactyla, var. dolichorhiza, *Nyl.*	”	
—— rufescens, *Hoffm.*	”	
—— polydactyloides, *Nyl.*	”	
Usnea ceratina, *Ach.*	”	8,000
—— florida, *Ach.*	”	8,000
Stereocaulon turgescens, *Nyl.*	”	7,000
—— denudatum, *Fl.*	”	
Cladonia diplotypa, *Nyl.*	”	6,000
—— fimbriata, *Hoffm.*	”	
Ramalina scopulorun, *Ach.*	”	8,000
Physcia speciosa, var. dactylifera, *Nyl.*	”	8,000
—— ——, var. hypoleuca	”	8,000
—— dilatata, *Nyl.*	”	8,000
—— speciosa, *Wulf.*	”	8,000
Parmelia megaleia, *Nyl.*	”	8,000
—— revoluta, *Fl.*	”	
—— sp.? non typica	”	8,000
Urceolaria scruposa, *Ach.*	”	
Lecanora subfusca, var. allophora	”	

On the Genus *Euptelea*, Sieb. & Zucc.

By Dr. J. D. Hooker and Dr. T. Thomson.

[Plate II.]

In Siebold and Zuccarini's 'Flora of Japan' (a work which contains figures and descriptions of a great number of remarkable forms of plants, many of which extend to the eastern provinces of India) there is figured, at t. 72, a genus *Euptelea*, referred provisionally by the authors to Ulmaceæ, the absence of ripe fruit making it impossible to determine its affinities with certainty.

In preparing for distribution the monochlamydeous plants of the Griffithian Herbarium, we have been so fortunate as to meet with specimens in fruit of a plant evidently belonging to the same genus, perhaps even specifically identical with that figured and described by Siebold and Zuccarini. These specimens were collected by Griffith on the mountain Thumathaya, in the Mishmi country to the east of the valley of Assam, in an extremely humid district, the flora of which has very intimate relations to that of China and Japan. On the ticket attached to the specimens, Griffith refers them to Cupuliferæ; but he had, no doubt, examined them in the most cursory manner, as we can find no reference to the plant in any of his published works.

As the Mishmi specimens serve to complete the character of this very curious genus, and give better data for fixing its place in the system, we have thought it desirable to lay the accompanying drawing before the Society. Instead of describing Griffith's plant at length, it may be as well to give a brief abstract of the character of the flowering plant, and then to point out the additions which the new materials have enabled us to make.

In the Japan plant, according to Siebold and Zuccarini, the flowers are destitute of perianth, the sexual organs being seated on a shallow excavation at the end of the peduncle. They are polygamous, some consisting of carpels only, while others are hermaphrodite, or rather male with rudimentary female organs. The stamens and ovaries are numerous and indefinite, but equal in number. The anthers are adnate at the end of a short erect filament, 2-celled and laterally dehiscent, with a terminal apiculate connective. The ovaries are stalked, compressed, obovate, with no style, but a linear stigma lining the inner margin from the apex down to the point of insertion of the single pendulous ovule.

The Griffithian specimens have a very few old leaves only, in shape like those figured in the 'Flora Japonica,' and consist of slender twigs, with short lateral branchlets profusely covered with short pedicels, each supporting at its extremity a single flower, consisting of a fascicle of from 10 to 20 membranous samaræ. The apex of the pedicel is quite flat, and not excavated as in the flowering state of the Japan plant. The samaræ taper downwards into a stalk their own length, and are thin and membranous in texture, scarcely swelling out at the seeds, obovate in shape, with a deep notch about the middle on the ventral suture, marking the attachment of the seeds and the lower end of the narrow linear stigmatic surface, which extends upwards along the edge to the broad apex of the samara. The seeds are 2–4 in number, with a hard, black, brittle testa, granular but not oily albumen, and a small embryo not more than one-sixth the length of the albumen. They are quite anatropous, and are closely packed together, nearly filling the cavity of the samara, the greater part of which is a mere wing not separable into two laminæ.

The structure of this remarkable plant is so simple, and at the same time points in so many directions, that it is not easy to determine its nearest affinity. As we have said, Siebold and Zuccarini refer it to Ulmaceæ, remarking that its carpels, though indefinite, would, if united in the axis, form a fruit only differing from that of *Ulmus* in being polycarpellary. Though the structure of the fruit and seeds by no means confirms this conjecture, it is worthy of note that the Indian specimens had, in the rough sorting of Griffith's plants, found their way into Ulmaceæ, and therefore did not attract particular attention till that family was being arranged for distribution.

Technically, of course, from the entire absence of floral envelopes, our plant should be placed in the Incomplete division of Exogens; but when we try to find a place for it in any of the families of Monochlamyds, the result is anything but satisfactory. The families with an inferior ovary may, in the first place, be left out of the question; and from most of those with a superior ovary the absence of stipules and the minute embryo remove it to a distance. Indeed it is needless, we think, to compare it with any but the apocarpous Monochlamyds, Lauraceæ, Myristicaceæ, Monimiaceæ, Proteaceæ, Thymeleæ and Piperaceæ. With some of these *Euptelea* agrees in the minute embryo, but in all other respects it is too different to make it possible to associate it with any of them in the same family. The minute embryo is no doubt a character of great importance, though not necessarily a mark of affinity, and existing in too many families to be available for the determination of affinity.

The stamens and carpels of *Euptelea* are so evidently seated on the torus, that we need not compare it with any calycifloral families. There is no doubt something in the habit which suggests a relationship to certain Saxifrageæ and to Hamamelideæ, but there is nothing in the essential characters to support this resemblance.

It is therefore among apocarpous Thalamifloræ, as a reduced and anomalous type, that *Euptelea* must find a place, unless indeed it be thought preferable to constitute of it a distinct family, in which case it would of course go to Incompletæ. This we think would be an unsatisfactory step; for although there is no family of apocarpous Thalamifloræ to which it can be referred without hesitation, it approaches several of them so very closely that its natural place seems to be in close proximity to them. The numerous samaroid carpels resemble a good deal those of *Thalictrum*; but the characters of the seed, and especially of the albumen, do not confirm this resemblance, while the habit is too different from that of Ranunculaceæ to make it desirable to place it there. The hard testa of the seed, the granular albumen, and the minute embryo agree with Magnoliaceæ; but the serrate leaves, with a sheathing base without stipules, are nowhere found in that order. In this character of the leaves—and further, in their close straight venation—we have an approach to Dilleniaceæ, from which the samaroid carpels and the want of an aril are sufficient distinctions. Anonaceæ and the other apocarpous families are too different to afford grounds of comparison.

The nearest affinities of *Euptelea* appear to us to be with Ranunculaceæ and Magnoliaceæ; and though, in the absence of floral envelopes, there is no very marked line of demarcation between these two families, yet the woody habit and the structure of the seed incline the scale in favour of Magnoliaceæ, in the first section of which, Wintereæ, which is characterized by the want of stipules and by the carpels forming a single verticil, we propose for the present to leave this very anomalous plant.

Were it not that Siebold and Zuccarini described their plant as one-ovuled, we should consider the Indian species identical with that of Japan. As this is a point on which a mistake is not probable, we propose to call the Mishmi plant *E. pleiosperma*, resting the diagnosis on the presence of 2–4 seeds in the ripe samara*.

A New Genus of *Hepaticæ*. By W. Mitten, A.L.S.

[Read December 17, 1863.]

ADELANTHUS.

Perianthium in ramulo brevi ventrali ad basin ramorum celatum, tubulosum, subtrigonum, ore connivente dentato. Involucri folia trifaria. *Flores* masculi in spicis parvis ventralibus. *Caulis* inferus procumbens, intricatus; stoloniferus aphyllus, ramis simplicibus erectis curvatis. *Folia* disticha, fere verticalia, margine dorsali decurrente.

A. falcatus. Jungermannia falcata, *Hook. Musci Exot.* t. 89. Plagiochila falcata, *Synops. Hepat.* 649. Alicularia occlusa, *Hook. f. et Tayl. Crypt. Antarct.* t. 62. f. 8.

Hab. New Zealand, *Menzies and Colenso*; Tasmania, *Gunn and Oldfield*. Lord Auckland's Islands and Campbell's Island, *Dr. J. D. Hooker*.

This species, so well figured in the 'Musci Exotici,' has been long misunderstood from Dr. Taylor's mistake in considering the perianths to belong to some *Aneura* accidentally intermixed with the original specimens; but so great is the resemblance of the habit and foliage to some well-known species of *Plagiochila*, as *P. opposita*, Nees, and *P. conjugata* (*Jungermannia*, Hook. Musci Exot. t. 91), that it was hardly to be expected that the fructification could be so different; add to this the fragility of the perianth itself, which seems partially decayed by the time the capsule has arrived at maturity, and it is easy to account for the error.

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* Within the last few days we have had an opportunity, through the kindness of Professor Miquel, of examining the carpels of *E. polyandra*, which are one-ovuled, as figured by Siebold and Zuccarini.

A. MAGELLANICUS. Perianthio elliptico-oblongo, apice dentato; involucri foliis parvis, dentatis.—*Plagiochila Magellanica*, Lindenberg, Sp. Hepat. 164; Synops. Hepat. 53. *P. sphalera* et *P. unciformis*, Hook. fil. et Tayl. Crypt. Antarct. t. 156. f. 5 et 8.

Hab. Magellan, *Montagne in Hb. Hook.* Hermite Island, Cape Horn, *Dr. J. D. Hooker.* Staten Land, *Menzies.* Cordillera de Raneo, Chili, *Lechler*, No. 2943. Chimborazo, *Jameson.* Falkland Islands, *Lechler*, No. 104. Tasmania, *Gunn, Hb. Hooker.*

Very variable in size, from half an inch to three inches in height, and the outline and denticulation of the inferior leaves is also variable; in the Tasmanian specimens all the leaves are entire, but there appears to be no other difference.

A. LINDENBERGIANUS. Plagiochila Lindenbergiana, *Lehm. in Linnæa*, iv. p. 367; *Pugill.* pl. iii. p. 53; *Syn. Hepat.* 59.

Hab. Cape of Good Hope, *Ecklon and Milne.*

Leaves rather more acute than is usual in the preceding species, but presenting no other difference; and unless some character is afforded by the perianth, as yet unknown, it can scarcely be distinguished.

A. DICIPIENS. Foliis involucralibus rotundatis, concavis, brevidentatis; perianthio ovato, ore parvo dentato.—*Jungermannia decipiens*, Hook. Brit. Jung. t. 50. *Plagiochila decipiens*, Nees et Mont.; Lindenberg, Species Hepat. t. 12; Gottsche, Lindenberg et Nees, Synops. Hepat. p. 24. *Plagiochila campylodonta*, Hook. fil. et Taylor in Lond. Journ. Bot. 1845, p. 80; Synops. Hepat. p. 639. *Gymnanthe decipiens*, Mitten in Journ. of the Proc. Linn. Soc. vol. vii.

Hab. Ireland, first gathered by *Miss Hutchins.* St. Helena, *Dr. Hooker.* Fernando Po, *Mr. G. Mann.* Quito, *Prof. Jameson.* Peru in Monte Tunguragua, *Mr. Spruce.*

The discovery of the perianths on Mr. Spruce's specimens has at length set at rest the hitherto doubtful place of this species, which has considerable resemblance to some species of *Plagiochila* and *Gymnanthe.*

The position of this genus appears to be near to *Sphagnœcetis*, Nees; and in the substance of its leaves, male inflorescence, and form of the perianth it entirely agrees; but differs in the erect branches, absence of stipules, and in the insertion of its appressed secund leaves.

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Ardisiandra Sibthorpioides, *H.f.*

W. Fitch, del. et lith.
Vincent Brooks, Imp.

Euptelea pleiosperma, *Hf. & T.*